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ANNALS
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I.

SYSTEMIC INFECTION OF MIDDLE EAR ORIGIN IN THE EXANTHEMATA.*

BY CHARLES R. C. BORDEN, M. D.,

BOSTON.

In order that we may better understand systemic infection of middle ear origin, let us briefly consider the specific infection, or toxemia, which is more or less a fundamental part of the three common diseases of the exanthemata.

Measles have been proven to be a bacteremial disease by experiments upon animals, but whether or not toxins are produced is as yet unknown. It is rarely a true systemic infection, though certain predisposing influences may give rise to a streptococcus or staphylococcus general infection. The striking peculiarity of the disease is its tendency to attack or involve mucous membranes, especially those exposed to the air. In severe cases this may amount to a definite injury to the vitality of the tissue. That very destructive disease, noma, is largely due to this specific action of measles upon mucous membranes, and is rarely seen except as a complication of this illness.

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*Read before the New York Academy of Medicine, Section on Otology, October 9, 1914.

Diphtheria is a local infection followed by the absorption of toxins into the lymphatics and blood stream. There is no striking tendency to systemic infection in diphtheria, but it may occur in rare cases. The marked peculiarity of this disease is the specific toxemia which is the usual cause of death, directly or indirectly, in the fatal cases. In the rapidly fatal cases this toxemia is, in a measure, analogous to the virus of a snake bite—the system is completely overwhelmed with the specific poison. In more prolonged, but none the less fatal cases, the toxemia causes degenerative changes in important organs, chiefly the heart, which in turn results in death. A third cause of death in diphtheria is paralysis of function of the pneumogastric nerve as a direct result of the specific toxemia. In the virulence of its systemic poison, diphtheria is far and away more fatal than either of the other two common exanthematal diseases in untreated cases.

The specific germ of scarlet fever is unknown, and a definite toxemia has never been established. The most striking characteristic of this disease is the lack of immunity against streptococcus infection. All manner of infections, both local and systemic, are common. General infection, such as septic endocarditis, septicemia, septic phlebitis, etc., are more or less common in severe scarlet fever attacks, and local infections of the ear, nose, throat, muscles, etc., are well known to physicians having experience with this disease. It is assumed by the majority of observers that there is a specific scarlatinal bacteremia present during the active stage of the disease. The cause of death in scarlet fever differs in different individuals. Like diphtheria, it may occur from an overwhelming toxemia. This is not as common, however, as death from nephritis or from various forms of septicemia. The organ most susceptible to the specific influence of the disease is the kidney. Two theories are advanced as the cause of this. One is that the disease has a specific toxic effect upon the organ. The other, that there is a local infection of streptococcus origin. Almost any organ of the body may become infected in scarlet fever, but the kidney, heart, serous cavities and joints are the usual serious or fatal complications. The lack of immunity to streptococcus infection does not cease with the active symptoms of the disease, but extends well into the period of convalescence. Nothing proves this statement more than the considerable number of cases of aural infection which occur during the convalescent stage of the disease. It is not unusual to have either acute otitis media or mastoiditis arise during the convalescent period. I know of one case which developed one hundred days after the active scarlet fever phenomena had passed. This phase is well illustrated by two interesting but rather extreme cases which occurred in connection with the Somerville Hospital during the past year.

The first instance was that of a child three years of age, who was in the hospital for more than six weeks with scarlet fever. All evidence of the disease except a discharging ear had disappeared, and she was about to be discharged when suddenly the mastoid became tender and edematous.

The other case was that of a child seven years of age, who developed an acute mastoiditis six days after being discharged from the hospital.

Complications in vital organs of the body in measles and diphtheria are not of especial importance to otologists, for the reason they rarely occur in conjunction with disease of the middle ear in the clinical cases. The writer found them present together in a large number of autopsy records, but his experience with clinical cases has proven them to be seldom recognized during the life of the patient. Moreover, because of the peculiar characteristics of the two infections, it is doubtful if diseased conditions of the middle ear or mastoid have any special bearing upon other distant organs. The one exception might be that of pneumonia and otitis media or mastoiditis occurring together in measles. But even in this combination, each disease may be purely local in its origin with no connection of importance between the two. Both are mucous membrane structures, and as such are especially liable to attack in measles. In scarlet fever, complications in any of the vital organs of the body may be vastly increased if diseased conditions of the ear become an added focus of infection to the toxemia already present. As a proof of this statement, cases 3, 4 and 5 are offered as evidence of the powerful influence exerted by the ear and mastoid upon such complications as those in the kidney, heart, joints, etc.

Systemic infections of middle ear origin, exhibited by a rise of temperature in every-day practice, are too well known for further discussion. In the three contagious diseases they are the second most common complication to arise, but are not important in the mild cases except in so far as the function of the hearing apparatus is endangered. In severe cases, particularly in scarlet fever, when they occur in conjunction with complications in other organs, aural diseases assume a rôle of importance which is not commonly recognized. Lest he be misunderstood in the matter, the writer wishes to state that he does not claim middle ear disease to be a primary source of infection in the heart, lung, joints, kidney, etc., but that when it occurs in conjunction with other organic complications, the influence of acute otitis media or mastoiditis is very great. We know that scarlet fever inhibits the resistance to streptococcus infection. If then the middle ear or mastoid become an added focus of infection to an already prostrated patient, the result must of necessity be a further increase of bacterial invasion. For example: In the event of inflammation in the heart or kidney, should the middle ear or mastoid give rise to the absorption of fresh toxins into the circulation, the already inflamed heart or kidney is still further called upon for increased activity. If the original infection was all the organ could withstand and continue to functionate properly, the secondary infection from the ear may be sufficient to completely overwhelm it and cause death to ensue as a direct result of the added toxemia from the ear. As an illustration of this point the following case is offered:

A young child, five years of age, was admitted to the Somerville Hospital, May 17, 1914. The following day the right ear ruptured spontaneously. Three days later she was taken with vomiting, and a large trace of albumin was found in the urine. Shortly after the ear trouble developed there was swelling and redness of the joints of the ankles and wrists. The child continued to be very ill, with no special aural symptoms other than a profuse discharge for seventeen days, when slight tenderness developed over the right mastoid. Two days later the mastoid became edematous. The case was reported to me about noon, and I engaged to operate at five o'clock in the afternoon. At three o'clock the child died. Both Dr. Morse and the writer firmly believe this little patient could have been saved had she been operated upon a few days earlier. To strengthen the value of our opinion in this particular case, we offer the following example, which occurred in the same institution sixteen days later:

E. B., aged five years, admitted to the hospital May 12th with scarlet fever. Shortly after admission the urine showed a large trace of albumin. Eighteen days later the right ear spontaneously ruptured. It continued to discharge for sixteen days, when there was marked pain and tenderness over the right mastoid. The mastoid was at once opened and found to be filled with pus. There was a fistula through the cortex and free pus beneath the periosteum. For two days the urine remained practically unchanged, neither increased nor decreased. It then gradually improved in character, and in six days became normal. Within a few days after the operation the patient showed marked improvement, and recovered in due season without further complications of any kind.

The second child was in every way as sick as the first, except for the joint inflammation. Thus, we feel that the death of the first patient, though primarily due to scarlet fever, was very much influenced by the mastoiditis present and unoperated upon. Had we recognized the severity of the aural complication, the result might have been as favorable as the second. In a similar situation we would not wait for the tenderness or edema to develop.

The marked influence paracentesis or spontaneous rupture of a drum membrane occasionally has upon the general condition of a seriously sick patient is often remarkable. In a number of clinical records in my possession, marked improvement occurred when pus was evacuated from the middle ear. The beneficial effect, moreover, was by no means limited to a decline in temperature, but was followed by distinct improvement in untoward symptoms in the heart, lung, kidney, joints, etc. In more than one record this phenomenon occurred, not once, but several times before the death of the patient. At autopsy, not only was the middle ear found to be filled with pus, but the mastoid as well. Is this not fairly conclusive evidence that otitis media and mastoiditis occasionally exert a far reaching influence upon other diseased organs? To further illustrate, may be cited a somewhat different case in the Brookline Contagious Hospital several years ago.

A strong, robust young boy, three years of age, was admitted to this institution with scarlet fever. During the acute stage of the disease nothing of special interest occurred. When the convalescent period should have been established, the child began to exhibit evidence of systemic infection. The glands in the neck became enlarged, temperature was elevated and the pulse became rapid and irregular. Later, the temperature became still higher and the right drum was found to be bulging. Paracentesis evacuated pus. At once the temperature fell to normal, the pulse lowered and the inflamed cervical glands subsided. A week or more later the glands again became swollen, the temperature gradually rose to 103.6°, and on this occasion several joints became reddened and painful. Again the right drum was found to be bulging and was incised, and all symptoms promptly subsided with the drainage of pus from the middle ear. A profuse discharge was maintained from the ear, but after several days the glands, joints, pulse, temperature, etc., became active again in an irregular manner. Finally, in spite of my endeavors to prevent it, the right mastoid showed typical symptoms of being involved. That cavity was then opened and found to be filled with pus. Several days previous to the mastoid operation the kidneys became sufficiently involved to give considerable anxiety to the physicians in charge of the case. Within twenty-four hours after the mastoid was opened the kidneys resumed their function, and from then on no complications of any kind occurred.

The contagious diseases have a natural period of incubation, reaction and convalescence. When one or more of these periods pass, either the patient has ceased to live, some organ becomes impaired and ceases to functionate properly, or convalescence becomes established and in due course of time the patient is restored to a normal state of health. During the active period of the disease, a certain amount of cell tissue is destroyed. The greater the prostration, the more cell tissue will be lost. If the system is not strongly overcome, the recovery will be rapid; if the prostration is great, reaction is prolonged. In a certain few cases the natural process of the disease develops to the period of convalescence, then week after week passes without the natural improvement. The vital organs functionate properly, temperature is normal, the surroundings and treatment of the case are of the most approved fashion; yet the progress of the patient remains at a standstill. In selected cases the one and only abnormal symptom present is a chronic aural discharge. As an illustration of an aural complication being the sole cause of a protracted convalescence, the following case is offered:

A young boy was admitted to the Somerville Contagious Hospital with scarlet fever. He was very septic from the first, having previously had a low degree of vitality. Early in the case he developed an infected ear which continued to discharge. The convalescence was very slow, but except for a marked devitalized condition, there was no focus of infection other than the middle ear. After eight weeks, Dr. Frank L. Morse, physician in chief of the institution, called the writer in consultation. We decided the ear was the cause of the protracted convalescence, and opened the mastoid solely for the purpose of establishing better drainage from the middle ear. To our surprise, we found the mastoid filled with pus. Immediately after operation the child's physical condition improved wonderfully and his recovery was rapid. This was the first case in which we operated upon the mastoid without active symptoms present in that organ, and from this patient we learned the valuable lesson that the interior of the mastoid cavity may be filled with pus without the symptoms ordinarily attributed to that disease being present.

In hospital practice at least, diagnosis is most often made in middle ear disease by the spontaneous rupture of the drum membrane. Next in frequency are the cases showing a sudden elevation of temperature, with or without earache. Sudden rises of temperature which can be explained in no other manner than due to the ear and in which the drum membrane is neither markedly normal or abnormal, cast upon that organ a burden of responsibility not easily disposed of. Dr. George A. Leland years ago described three distinct types of drum membrane which are indicative of acute otitis media, and his description cannot be improved upon.

The writer is especially interested in the condition of the mastoid in the severe cases of the contagious diseases. He knows from a study of a large number of autopsy records that both acute and chronic mastoiditis are present in many unsuspected cases. Both acute and chronic forms of the disease may remain unsuspected for a considerable length of time. The symptom of edema over the mastoid or of protrusion of the auricle are late symptoms, and usually occur after the cortex has perforated. Temperature amounts to absolutely nothing as a diagnostic point, and tenderness over the mastoid is of value only when present. Its absence means nothing.

In a severe case of scarlet fever in which the septic influence of the disease is manifested in such a complication as septicemia or acute nephritis, if one or both middle ears become infected, the mastoid may also be suspected of being involved. In the early stages, symptoms of an acute nature will be limited to the middle ear, and the classical symptoms of mastoiditis (pain on pressure, edema, protrusion of the auricle, etc.) will not appear until later. If, however, the mastoid is opened in the early stages, its cavity will often be filled with pus. If, in the event of serious complications in vital organs, paracentesis causes marked temporary relief, but later the symptoms return and remain active until another paracentesis is performed, then the mastoid may be considered to be infected and should be opened at once. The necessity for repeated paracenteses is in itself a strong indication for the mastoid operation. If cold applications to the mastoid region cause a drop in temperature, or a marked relief of symptoms in other parts of the body, such as the kidney, joints, etc., the improvement gained thereby is to be viewed with extreme suspicion. The application of cold will often temporarily decrease bacterial absorption from ear or mastoid, but only at the expense of valuable time. The writer firmly believes the use of an icebag is absolutely contraindicated when aural complications occur in serious cases of the exanthemata. The predominating toxins and predisposing agents in this class of cases are so powerful and virulent as to make the application of cold entirely inadequate to cope with the situation. It may, however, mask important symptoms sufficiently long to make their use a positive menace to the patient's life. Frequent paracenteses are also weak reeds to lean upon, as even the desired drainage from the middle ear is not sufficient to overcome suppurative mastoiditis when present. This is particularly true if a temporary improvement follows each incision. The following cases illustrate examples of mastoiditis being present without the usual symptoms:

E. P., three years of age, a pitiful specimen of humanity, feeble minded and blind, developed otitis media twenty-one days after admission to the hospital. Both ears continued to discharge copious amounts of thick pus. Four weeks later, without further symptoms, both mastoids were opened. One was practically normal, the other was found to be almost eaten away. The lateral sinus was exposed three-fourths of an inch and was bathed in pus and covered with granulations. After operation the child's general condition improved wonderfully, and in due time both middle ears became dry.

M. L., a girl of eleven years, was admitted to the same institution with scarlet fever. She developed an acute ear nine days later. When examined by the writer, twenty-one days afterward, there was a profuse discharge from the right ear. Inspection showed a perforation in the lower margin. The drum was red and slightly bulging. There was no temperature or untoward symptom in the case other than prolonged convalescence and the chronic discharge. The mastoid was opened and found to be entirely sclerotic, requiring the constant use of mallet and chisel. On nearing the antrum the chisel suddenly slipped into an opening which proved to be an abnormally large antrum. A probe introduced into this cavity found the entire roof of the antrum, aditus and middle ear to be wanting. The dura was exposed, covered with granulations and bathed in pus. Possibly this patient was a candidate later for a brain abscess or meningitis with the ordinary treatment of the middle ear. Such dire consequences cannot be predicted for her, however, as both brain abscess and meningitis are rare in the contagious diseases even with unrecognized mastoiditis. In fifty-nine such unrecognized cases, brain abscess did not occur at all, and meningitis was present in but one instance, though a fistulous tract was found leading from the middle ear to the cranial cavity in four. After operation the last case showed the same improvement in rapid convalescence as did the first, and the middle ear became dry in a short time.

The importance of radical surgical procedures when middle ear disease occurs in conjunction with serious complications in other vital organs cannot be overestimated. The extreme necessity of ridding the system of added bacterial invasion before the patient is overwhelmed is great. For the severe septicemia such as occurs in scarlet fever from the toxemia of the disease itself, we have few remedies at hand. Specific antitoxins cannot be obtained in scarlet fever and measles. Antistreptococcus serums are ideal in theory, but they have utterly failed in their mission. Local infections with the formation and absorption of toxins in the glands, tonsils, etc., are often opened with splendid results. The middle ear and mastoid belong to the local infection group, and can be as easily and quickly eliminated if diagnosed sufficiently early.

Fear of anesthetics or of surgical shock is not as grave a question as it would appear. On first thought, it would seem exceedingly rash to administer an anesthetic or to operate upon a patient who was profoundly septic or greatly weakened from overexertion of the vital organs. To give an anesthetic to a patient with pneumonia or acute nephritis would seem, on the face of it, extremely foolhardy. The writer has given ether and operated upon one or both mastoids with each of the above complications present, and has never known harm to result or the complication to be increased in severity. Several of the patients were desperately ill, but in each and every case the desired result was quickly forthcoming. In each instance the operation proved that draining the infected mastoid cavity did far more good than ether or surgical shock did harm. Thus far the writer has never had a death from this class of a case, though he has had considerable difficulty at times in obtaining permission to operate upon such apparently poor surgical risks.

In every instance, ether alone was used as the anesthetic. One case had double mastoiditis, more or less general septicemia, pneumonia, and almost complete suppression of the function of the kidneys. The effect of the operation was most pleasing, as all the complications soon subsided and the patient recovered without further complications of any kind.

I have operated upon at least half a dozen cases having acute nephritis well advanced. In no case has the ether appeared to have affected the kidneys unpleasantly. In the event of pneumonia as a complication, chloroform alone, or mixed with ether, might be substituted for pure ether in the hands of an expert anesthetist. Personally, the writer is much more afraid of the choloroform than he is of the complication. Surgical shock has never entered into the situation in any of my cases.

There seems to be a difference of opinion in regard to the virulence of infection in aural discharges. Dr. Place, of the

Boston City Hospital, states that nasal secretions are the most virulent. Dr. Morse, of the Somerville Hospital, gives preference to the ear in this respect. One striking case of an aural discharge spreading infection occurred in a case operated upon for mastoiditis in the Somerville Hospital. The wound healed all but a tiny scab. Because of lack of room in the institution, the child was discharged to make room for others. The mother neglected to comply with instructions regarding the necessary cleanliness, and the child promptly infected one brother and two sisters with a virulent type of scarlet fever. The two sisters died of the disease. A case recently released from the Boston City Hospital developed a nasal discharge after leaving the institution, and infected four other cases with scarlet fever.

Both aurists and general practitioners of medicine may study aural complications more carefully, with profit to themselves and their patients. Only a comparatively few general practitioners understand the significance and dangers of such complications. The average physician at large recognizes an aural complication only when a profuse discharge from the ear refuses to be concealed any longer. The particular lesson for the average specialist to learn is not to wait for the last possible symptom of mastoiditis, jugular thrombosis or meningitis to develop before taking active operative measures for the relief of urgent symptoms. The extent to which this practice is followed by men whose wide experience should have taught them better judgment in the matter, is astonishing. The excuse given is the patient is too ill to be operated upon. The sufferer is therefore allowed to die and the one real opportunity to save his life is lost.

II.

AN ACHING THROAT.*

By G. Hudson Makuen, M. D.,

Philadelphia.

The specialist nowadays is confronted with so many serious problems, or problems involving the question of life or death, that he is apt to overlook thöse of a seemingly less serious nature and oftentimes to neglect them entirely. The affection which I am about to describe is one that is not dangerous to the life of the individual, but it is exceedingly annoying and detracts greatly from the pleasure of living.

An aching throat, like an aching ear or an aching tooth, is a condition sufficiently common and sufficiently important to call for careful consideration. The affection occurs for the most part in those who are nervously and physically below par, and it may be the result of one or many etiologic factors. Dr. W. H. Kelson, an English physician, says that it is frequently associated with constipation and flatulent dyspepsia, and that it may be due directly to toxic infection, or it may be a referred pain, such as that which occurs in diseases of the larynx and upper part of the esophagus. He furthermore states that alcohol seems to be a factor in the causation of the affection in many instances, and that it aggravates the trouble in all cases.

The local conditions which accentuate, if they do not actually cause, the affection are found in the pharynx, nose, accessory sinuses, and teeth. It is well-known that earache, with which an aching throat is comparable and frequently associated, may be the result of similar etiologic factors, the particular one or more of which being determined oftentimes with great difficulty and usually by the process of exclusion.

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*Read before the joint meeting of the Southern and Eastern Sections of the American Laryngological, Rhinological and Otological Society, January 9, 1915.

It has been my fortune to see two cases in which a severe aching throat was the chief cause of complaint, and the affection continued intermittently in both of them for a period of several years.

The first case was that of a man, forty years of age, who complained of having had throat and voice trouble for years. He was a member of the bar and did a considerable amount of public speaking. His pharynx was highly congested, the faucial and lingual tonsils were slightly enlarged, and he had had several attacks of tonsillitis. He also had flatulent dyspepsia and more or less constipation, but no rheumatism or gout. He was not addicted to excesses of any kind, and he indulged in neither alcoholic stimulants nor tobacco. He had a catarrhal condition in the nasopharynx which was accompanied at one time by an offensive unilateral discharge suggesting sinus disease, but this cleared up and the transillumination test was negative. The patient's chief complaint at the time of consultation was pain in the left side of the throat, and he thought he could locate its origin in certain congested lymphoid follicles in the lower part of the pharynx.

Portions of a small but degenerated faucial tonsil on the left side were removed, as well as portions of the lingual tonsil, and the various pockets formed by inflammatory adhesions were opened up with the angular knife and cautery. Relief always came or seemed to come after these operations, and especially after the use of the cautery in one or more of the diseased follicles to which I have referred, and he persisted in the treatment for many months, locating for me the point or points in the pharynx in which the pain seemed to originate and from which he said it radiated upward toward the region of the ear. We finally succeeded in removing or destroying these points of irritation and possible infection, and the trouble for the most part cleared up in a satisfactory manner, and the voice correspondingly improved.

In the second case we were not so successful. The patient was a maiden lady, about thirty years of age and in fairly good general health, having but little digestive trouble and no rheumatism or gout. The aching seemed to begin in the left tonsil, and from this point it occasionally extended to the mastoid and sometimes to the frontal region. There was a slight nasopharyngeal catarrh, and the faucial tonsils were enlarged and degenerated. The upper teeth were in good condition, but the two lower posterior molars on the left side had large cavities which had been filled, one with amalgam and the other with gold. During the time of treatment, however, the teeth seemed to be giving no trouble whatsoever, and we thought that they could be eliminated as possible causal factors. The various nasal accessory sinuses were also examined and the transillumination tests were made, but no disease of any kind was found in these regions.

I suggested a removal of the faucial tonsils in an effort to relieve both the nasopharyngeal catarrh and the aching throat. This was done under general anesthesia, and the operation was altogether satisfactory, there being no cicatricial contractions or adhesions whatsoever. In fact, if I had not done the operation myself, I should say that it was one of the cleanest and best results I have ever seen. The catarrhal condition cleared up satisfactorily, and the hearing, which, by the way, was slightly impaired, also improved, but the aching throat continued and, if anything, increased both in intensity and in the frequency of the attacks.

The patient was under observation for several months, and therefore I was able to make a careful study of the condition. The aching throat, as I have said, not only continued, but became considerably aggravated immediately after the removal of the tonsils, although the healing of the wound was uneventful and finally complete.

The diet of the patient was carefully regulated and the hygienic conditions of her home environment carefully looked after, but all our treatment failed to give complete satisfaction and only slightly alleviated the discomfort and sometimes the actual pain which the patient suffered.

I have reported these two cases at some length, because they seem to me to present problems of considerable interest. The affection is not a common one, and its etiology is still in doubt. My own experience with it leads me to think that there probably are many causal factors, and that they act conjointly in giving rise to the condition.

III.

BACTERIAL VACCINE THERAPY IN DISEASES OF THE EAR.*

By Wilfrid Haughey, A. M., M. D.,

Battle Creek.

The theory of vaccine therapy is sufficiently appreciated to obviate the necessity of repeating at this time. A few general principles may be stated, but chiefly I shall confine myself to an inquiry as to its value in diseases of the ear.

The use of stock vaccines reflects no particular credit, a careful bacteriologic diagnosis usually not being considered necessary. The general symptoms and characteristics of the suppurative or inflammatory process are considered, and a guess often made as to the causative germ.

A mixed vaccine is then given in the hope of striking the nail with one of the constituents of the vaccine. Frequently no benefit is seen, and the method is discredited.

The opsonic index and socalled negative phase are not now dreaded to the extent of a few years ago. We do not use them much, watching rather the general condition of the patient and the diseased process, being thus guided in repeating our dose.

Autogenous vaccines should be carefully made, extreme care being taken in making the culture to have all secretions wiped out of the canal and the canal disinfected with alcohol. The pneumatic otoscope is used to draw out any secretions which cannot be reached by a sterile platinum loop in the tympanum or attic. When the culture is secured in this way, we are reasonably certain to secure the responsible active organism. Too great heating of the vaccine in killing the germs may very easily lead to inactive vaccine, and no result in treatment.

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*Read before the Southwestern Michigan Triological Society, at Battle Creek, Michigan, December 7, 1914.

In my cases I have used dry cleansing and other routine methods of treatment, together with attention to the nose, for at least a week without result before using the vaccine. I have kept up the local treatment in conjunction with the vaccine.

Acute suppurative otitis media generally responds promptly to ordinary cleansing treatment. In these cases I have not used vaccines. I have first satisfied myself that the condition is subacute or chronic. Wright, Pearce, Dabney, and others, however, advise the use of autogenous vaccines in all cases where it is at all possible to get them, on the ground that the condition will clear more promptly and more completely, recurrence being more rare.

Dabney (*N. Y. Med. Jour.* for 1912) mentioned that there is an improved general condition in many of these patients following the use of vaccines, and I have found a similar result.

Case 1.—H. R. F., man, twenty-four years old. Right ear and auditory canal very tender, upper posterior wall of canal sags and extremely tender. Mastoid region tender. Paresthesia over distribution of facial nerve. Throat has been sore for a week. Micrococcus capsulatus mucosus found in throat and also after paracentesis. Temperature 103°. Diagnosis, acute mastoiditis. Operation declined. Stock vaccines used, and after three injections at intervals of three and four days respectively, beginning with one hundred million and doubling at each injection, the condition entirely cleared. Patient now in French war zone with Canadian army.

Case 2.—F. J. C., man, thirty-five years old. Double paracentesis for double otitis media. Ears discharged freely, a mixed infection with staphylococcus pyogenes predominating. This man was a commercial traveler and very anxious to proceed on his way. The discharge persisted, so I used a commercial mixed vaccine of two hundred million each of staphylococcus pyogenes albus and aureus, two injections, after which the discharge promptly cleared and the drums healed.

Case 3.—J. L. W., woman, twenty-two years old. Right ear deaf a year or more, left also becoming deaf. Both ears discharging foul pus from marginal ulcers on posterior quadrants of drums. Treated two weeks, then began using stock vaccine, mixed staphyloccocus pyogenes aureus and albus, the infection being of staphylococcus nature. Six injections were given at intervals of four to seven days, with complete drying of discharge and improvement of hearing. The perforation of the right drum was large and closed only under a paper patch. This drum developed another perforation six months later with discharge of nasal mucus following "cold in the head," but promptly cleared under suitable treatment.

Case 4.—E. McC., boy, six years old. Scarlet fever three years previous. Both ears discharged for a long time. Right ear still discharging a foul sticky grayish pus through a large anteroinferior perforation. This ear cleared in about eight weeks with treatment once a week—patient living outside of town. The condition recurred at the end of four months. At this time stock vaccines were used consisting of staphylococcus pyogenes aureus and albus, Friedlander bacillus and a streptococcus, to correspond as near as we could to the mixed infection present. Ten injections at one week intervals failed to clear the condition, the weekly treatment and cleansing being probably too infrequent, but I could not prevail upon the parents to let me see the boy oftener. Autogenous vaccines were then substituted for the stock, and after seven treatments at week intervals, and one four weeks later, the ear entirely cleared up and has remained so more than a year.

Case 5.—H. M., boy, one year old. Had been treated elsewhere two weeks for discharging ear. I was unable to clear it in ten days, so used a vaccine which had been prepared for another case, and after two injections at four day intervals secured complete healing with drying of discharge and closure of perforation. This was a staphylococcus infection and vaccine.

Case 6.—H. S., girl, fourteen years old. Left ear has discharged since she was a small child. Right ear discharged for long time, but not now. Discharge from left ear scant, but very foul. Examination showed a mass of débris filling the whole canal and hard as bone. It took me several days to clean this out because of the pain and refusal of anesthetic. I had to cut the mass into pieces. Family had been told by an aurist that there was no canal. The superficial layer had been disintegrating and discharging. Under the mass the drum and parts of the ossicles were gone. Some cotton was found in the deeper parts, and a very foul discharge, staphylococcic, which did not respond promptly. I administered four injections of autogenous vaccine at four, eleven and seventeen day intervals, this being the best I could do on account of patient living in another town. The discharge almost stopped under the first two treatments and was entirely clear at the last, but the injections were given on general principles. A year and a half has passed with no recurrence.

Case 7.—E. M., girl, two and one-half years old; weight, seventeen and one-half pounds. Mother died of tuberculosis when child was one year old. Left ear had a profuse and very foul discharge of several months' standing. Did not clear in two weeks' treatment. Autogenous vaccine then prepared and two doses of twenty million given six days apart. There was prompt healing, and the perforation had closed in another week. I failed to learn the variety of the germs found in culture, the laboratory sending me the vaccine without bacteriologic report.

Seven months later this child was brought to me with the other ear in a condition similar to the first. This cleared after seven routine treatments, but recurred three months later, at which time I gave two doses of the vaccine prepared for the first ear, five days apart, with marked improvement. The child objected so strenuously that we discontinued the vaccine and continued the other treatment with complete recovery after six weeks of desultory treatment. This child stayed normal six months, when she died of pneumonia, according to newspaper report.

Case 8.—H. B., girl, three and one-half years old. Had earache and convulsions. Acute otitis media. Paracentesis performed and a very profuse discharge secured of a short chained streptococcus with a small spirocheta. I treated this carefully every day for three weeks, with no marked improvement. Then administered autogenous vaccine March 20th and 24th, 1913. The discharges stopped and patient did not return until May 22d, when there was a slight recurrence, but this promptly cleared with one injection of the vaccine. There has been no recurrence.

Case 9.—I. K., girl, two years old. Has had a fever around 103° for three weeks with swelling back of ears. Ears broke and began to discharge through canal, then fever came down to 101° and case referred to me. Ears treated every day for a week, but mastoid still tender and ears still discharging with temperature normal. Autogenous vaccine prepared and four injections given at five day intervals with complete recovery. Over a year and a half has passed and no recurrence has been reported to me.

Case 10.—R. N., boy, four years old. Acute otitis media with spontaneous rupture. Mastoid tender, but I believe only hyperemic. After two weeks' treatment ear was still discharging profusely, but mastoid tenderness had gone. Autogenous vaccine (combined staphylococci and streptococci) given at four and five day intervals for three injections, when the ear was completely cured.

Case 11.—F. W., man, thirty-three years old. Ear had been discharging for three days. This was a recurrent condition and had been present for several years, discharge gradually clearing up each time after several weeks' treatment. I found a very large perforation in the lower part of the right drum, and a profuse discharge full of streptococci, staphylococci, a few small spirochetæ and detritus. Hearing reduced one-half. Immediately had an autogenous vaccine prepared and gave one hundred million; dose repeated after three days with two hundred and fifty million, then repeated with intervals of seven, four, five and four days. The ear became perfectly dry and remained so for three weeks, when there was a recurrence that cleared up with one injection of vaccine. A paper patch was placed over perforation, which stayed on three months and left the hole closed. At the end of another six months, during a severe "cold in the head," a blast was blown through this drum, and for a few days discharge of nasal mucus persisted, until I succeeded in convincing the patient that a cure depended wholly upon himself. The discharge promptly stopped with proper nasal hygiene, and another paper was placed on the perforation. Two months later the paper was still in place. Six months more have passed and no recurrence of trouble. Hearing is now normal, and patient reports that paper patch came out four weeks ago. Drum healed.

Case 12.—J. W., woman, twenty-two years old. Mastoid operation several years ago. Had earache with ringing and throbbing for three days. Posterosuperior canal wall sagging, whole mastoid region tender. Paracentesis secured profuse discharge which did not respond in a week's treatment, whereupon a fifty million dose of autogenous vaccine was administered, followed four days later with one hundred million, and then three doses at four day intervals of two hundred million. The discharge from the auditory canal ceased and drum healed, but a tender spot still remained in the scar of the old operative field. This was incised and healed in three or four days. I heard that about a year and a half later she had a recurrence treated elsewhere, so cannot report as to the nature of the recurrence. After the administration of the vaccine under my care, her general health improved as well as her ear.

Case 13.—J. G. C., woman, age thirty-six years. All mucous membranes congested; sinuses painful; left mastoid very tender. Left ear discharging. This condition cleared up under general and local treatment in two weeks, but recurred three months later. The left ethmoidal region showed acute infection; middle ear and mastoid tender, but no discharge. Culture made from ethmoidal discharge showed a mixed streptococcus and staphylococcus infection. Autogenous vaccines were prepared and eleven injections of one hundred million dose given at intervals varying from three to six days. The condition cleared entirely and has not returned for twenty months. Two of these injections were made after all soreness and inflammation were apparently gone.

Case 14.—L. P., boy, age seven years. Had been sick with mixed infection of scarlet fever and diphtheria for five weeks. Ears discharging and bulging for nearly two weeks when I saw him. Discharge from both ears profuse and foul. Patient had a septic temperature, emaciated and unconscious. Doctor in attendance thought he was dying. Double mastoid operation. Subperiosteal abscess on left side contained nearly an ounce of pus. Found much necrosed bone and granulation tissue all through mastoid cortex. Antrum and attic filled with granulations of a foul nature. Open dressing. Right side presented no pus until cortex was opened. Pus profuse and extremely foul; bone necrosed and curetted easily, leaving a great cavity. Attic and antrum full of foul granulations. Cleaned as best we could without disturbing ossicles. Boy doing very poorly under anesthetic and operation necessarily hastened. Open dressing, no suture on either side. Time of operation from beginning of anesthetic (chloroform) until completion of dressing and boy returned to bed, one hour and ten minutes. The discharge on the dressing was very profuse and foul. Autogenous vaccines prepared and administered after five days. Seven injections at intervals of three to six days were given. Posterior wounds healed slowly, but boy soon picked up in general health, then healing was much more rapid. Discharge almost stopped, there remaining only a stringy mucus. After a couple of months I again gave four doses of autogenous vaccine in an endeavor to clear this condition, but without success. At the expiration of eighteen months after operation he still has the stringy sticky discharge in very small amount, but is a strong, robust boy. I feel that the vaccines in this case were not a complete success, although great general improvement undoubtedly ensued. I believe there is no necrosed bone left in the ears and contemplate another course of autogenous vaccines.

Case 15.—J. T., girl, age fourteen years. Has had discharging ears with great deafness since she was five years old. Discharge profuse and very foul; so much so that her schoolmates shunned her. Hearing 25/90 each ear by air conduction. Bone conduction increased, 65/45. This child has had several courses of treatment by douches, powders, etc., extending over long periods of time. By dry cleansing and use of glycerophenol 1/12 I succeeded a couple of times in drying up discharge, only to have it recur. Autogenous vaccines were then made, but eight injections at varying intervals made no impression. Cleansing daily with alcohol, glycerophenol, tannic acid, boric alcohol, hydrogen peroxid, boric acid and calomel powder, formalin, etc., for six months made no impression. Operation was decided upon—double meatomastoid. The cortex was eburnated—all cells filled up and solid as ivory until the antrum was reached, which with the attic and tympanum was full of foul granulations. These were cleaned out as well as possible without removal of ossicles; opening made into posterior wall of meatus and posterior wounds closed by first intention. Discharge is now scant, and I contemplate another course of autogenous vaccines. Hearing 75/90 by air conduction. General health much improved immediately following use of vaccines. Odor of discharge has been slight since vaccines were first used.

Case 16.—J. R., girl, age seven years. Had had discharging ear for several weeks. Did not heal with ten days' treatment. Autogenous vaccines given at intervals of four to seven days. Five injections resulted in complete cure and no return for twenty months.

SUMMARY.

I have reported six cases which I shall call subacute otitis media purulenta. Some were of comparatively short duration before vaccine treatment, but all had been thoroughly treated for from one to three weeks before use of vaccines. Other treatment was not suspended. One case was treated with stock vaccine, one with a vaccine autogenous for case 9 listed in this group, and four were with autogenous vaccines. All six cured.

There are six cases of chronic otitis media purulenta reported. One was treated with stock vaccine, three with autogenous vaccines, and one at first with stock vaccine unsuccessfully, later successfully with autogenous vaccines. In the table this case appears twice, once as a failure under stock vaccine and once as a cure under autogenous. The sixth case was the double meatomastoid case; autogenous vaccines made only slight improvement so far as the ear was concerned, not at all clearing the discharge.

There are also four cases classed as mastoiditis. One a simple acute micrococcus mucosus infection, cleared under stock vaccines. The second, a recurrence in an old mastoid wound, cleared under autogenous vaccines. The third, acute mastoiditis, was cured with autogenous vaccines. The fourth, postscarlatinal and postoperative, improved, but dischage still present in small amount.

While my experience has not been very extended, it has been confirmatory of the findings of others over a number of years, and indicates that, especially in slowly healing cases, we should give our patients the benefit of this branch of therapeutics.

The study of the accompanying table, from Dabney, *Laryngoscope*, Nov., 1914, to which these cases are added, shows that in the treatment of subacute purulent otitis media if we deduct the nine and one-half per cent of cases which were lost sight of before treatment was completed, there were seventy-eight per cent of cures, thirteen per cent of improved and nine per cent showing no improvement.

In chronic purulent otitis media the percentages are: cured twenty-eight per cent, improved thirty per cent, and not improved forty-two per cent.

Author.	Disease.	Number	Cured	Improved	No change
McDonald	Subacute O. M. P.	13	13		
	Chronic O. M. P.	17	3	5	9
Weston & Kolmer	Subacute O. M. P.	100	83	10	7
Patterson et al.	Subacute O. M. P.	10	7	0	3
	Chronic O. M. P.	17	3	3	11
Conners	Subacute O. M. P.	7	2	3	2
Christie	Subacute O. M. P.	6	6		
Jacobs	Chronic O. M. P.	6	2	4	
Thomas	Chronic O. M. P.	1	0	0	1
Hoobler	Chronic O. M. P.	2	2		
	Mastoiditis	1	1		
Beck	Chronic O. M. P.	7	0	7	
Scott	Mastoiditis	1	1		
Hill	Subacute O. M. P.	124*	70	22	5
Dabney	Furunculosis	36	36		
	Chronic O. M. P.	22**	7	5	10
	Subacute O. M. P.	23	18	0	5
	Mastoid sinus	15**	9	4	2
Haughey	Subacute O. M. P.	6	6		
	Chronic O. M. P.	7	5		2
	Mastoiditis	4	3	1	

*Three operated for mastoiditis: twenty-three disappeared.
**Two diabetics.

In mastoiditis there are sixty-seven per cent of cures, twenty-four per cent of improvements and nine per cent of failures.

In subacute otitis media and in mastoiditis (acute) the cures and improvements together amount to ninety-one per cent each—a very decidedly favorable report. Of course, the question promptly arises, Would not many of these have improved without vaccines? The only answer we can give is that in most, at least of those here studied, they had not responded under one to three weeks of treatment without vaccines. Even if one-half be deducted to take care of all the cases which might have so improved, the balance is still too good a showing to warrant discarding this method.

In chronic otitis fifty-nine per cent show cure or improvement, a considerable number, considering the handicap, and too good a showing also to warrant neglect of this aid in our armamentarium.

IV.

MENINGITIC SUPPURATIVE EXTRADURAL ABSCESS OF THE POSTERIOR FOSSA OF THE SKULL AFTER PURULENT TONSILLITIS.

By Dr. Oscar Beck,

Vienna.

There is a comprehensive literature concerning the dangers which threaten the organism as a result of inflammation of the tonsils and the sequelæ of acute infections of the throat. This subject was well covered in the thorough review of Kuttner on the acute throat infections, presented at the Seventeenth International Congress in London. I am adding a word to the literature on this subject, because the following case of mine seems to present an almost unique example, and as far as I can discern in the records, only one parallel case is recorded.

History.—A seven-year-old child, always well, according to the statement of the father. The child had had none of the socalled diseases of childhood. After playing contentedly all day long, apparently in the best of health, on the night of April 10th the patient suddenly became ill, with high fever, great restlessness, crying out, persistent severe vomiting, headache and dizziness. The physician called to see the case could find no internal cause for the symptoms. The child showed complete paralysis of the left facial and abducens nerves, with a spontaneous nystagmus toward the right. The patient complained of diminished hearing in the left ear.

The condition did not improve during the next few days, and the child was taken to Lemberg, where a neurologic examination was made. I am not conversant with the exact details of this examination. However, the child was admitted to the Vienna Ear Clinic with a provisional diagnosis of tumor cerebri. I lay special stress on the fact that the patient's father and the child walked into the clinic. On admission, April 21, 1914, the patient had a temperature of 38.7°.

Status Presens.—Child is normally developed, understands all questions and answers correctly. The skull is generally sensitive to percussion. No neck rigidity. Spontaneous and passive movements of the head cause no pain. Severe headache and moderate dizziness are present.

Findings of the cranial nerves.—Left corneal reflex absent; left abducens paretic; left facial paretic in all three branches. All other cranial nerves reacted normally. Tendon and cerebral reflexes normal. No hypo- or hyperirritability, no differences in irritability of the two sides. No Babinski, Oppenheim or Kernig. Mouth and pharynx configuration normal. No difficulty in swallowing. Internal examination revealed a slight degree of bronchitis on the left side.

Ear Findings.—Right: Middle ear, cochlear and vestibular organs normal. Left: Middle ear catarrh, complete deafness. Spontaneous rotatory horizontal nystagmus of the first degree, toward the right. The left vestibular apparatus is unresponsive to all tests tried.

Lumbar Puncture.—Pressure not increased. Fluid clear. A small fibrin web containing few lymphocytes. No polynuclears or bacteria are precipitated by means of the centrifuge.

The clinical picture remained unaltered for the next few days. Frequent examination of the mouth and pharynx always negative. No changes noted in the nervous symptoms. On April 24th the temperature rose to 40°. On April 25th at 9:30 o'clock in the morning, the child suddenly became moribund. Pupils were narrowed, reactionless, respiration 30 per minute, Cheyne-Stokes in type, pulse 124. The upper and lower extremities were flaccid, no reflexes obtainable. Incontinence of urine and feces.

Lumbar puncture being again made, pressure was not increased. Fluid slightly cloudy, contained polynuclear leucocytes and many streptococci.

Autopsy (Dr. Erdheim).—Old purulent tonsillitis right. Fresh purulent tonsillitis left. Large retro- and subpharyngeal abscess, which extends into a large abscess cavity in the bones of the base of the skull. The bony base of the skull is completely destroyed at this point, and while the overlying dura seems to be intact, it is distinctly hyperemic and is covered with a thin fibrinous membrane over the clivus and the posterior surface of the sella turcica, pachymeningitis interna.

The hyperemia of the dura is most marked at the meatus acusticus internus. On the introduction of a probe into the cavity which results from partial destruction of the occipital, sphenoidal and petrous portion of the temporal bones, one finds that the bone defect is confined to the left side and is sufficiently large to involve the points of exit of the left trigeminus, abducens, facial and acusticus nerves. Stripping off the dura from the middle fossa of the skull on the left side, reveals the fact that the right apex of the pyramid is destroyed and that pus extends as far forward as the under surface of the Gasserian ganglion.

In the left middle ear a large amount of clear mucoid fluid was found. The right tympanic cavity shows a dry mucosa. Fresh purulent meningitis with a collection of cloudy yellow exudate almost completely confined to the base in the cisterna chiasmatis and the cerebral medulla. The leptomeningitis follows along the Sylvian fissure, and to a slight degree on to the convexity of the brain, which is completely free from purulent exudate.

Small areas of bronchopneumonia in the right lower lobe. Parenchymatous degeneration of the heart, liver and kidneys. Ascaris in the duodenum.

To sum up, this was a case characterized by the sudden appearance of symptoms referable to a lesion in the left posterior fossa of the skull, involving the trigeminus, abducens, facial, cochlear and vestibular nerves. Otherwise, neurologic examination was negative.

Such isolated affections have been described by Frankel-Hochwart. He described a basal process, in fact a polyneuritis, involving the facial and acoustic, which he calls polyneuritis cerebralis meniereformis. This symptom complex, which often develops on a rheumatic basis, must also be taken into consideration in discussing this case. One must also bear in mind that this might be that form of poliomyelitis which is characterized by a predominance of cranial nerve symptoms. Wikmann, following Medici's lead, distinguishes a bulbar or positive type of this disease, depending upon the distribution of the paralysis or the prevalence of certain symptoms. This form corresponds fairly well to the type described by Zappert, in which there are cerebral symptoms, especially those pointing to cranial nerve involvement, seldom with cortical symptoms. Very often the abducens is involved with the facial. A beginning tuberculous meningitis was also considered, hence the lumbar puncture. But as the spinal fluid pressure was not increased, the fluid clear, and the cell count low in lymphocytes, the symptoms had to be considered as due to another cause. Besides, blocking of the cochlear and vestibular nerves is very rare in tuberculous meningitis.

The autopsy cleared up the clinical picture. A rather rare sequence of events followed a purulent tonsillitis, a retro- and suprapharyngeal abscess developed and, as it increased in size, pressed upward against the base of the skull, destroyed the bones in their entire thickness and involved all the parts of the floor of the left posterior fossa in a large subdural abscess. An X-ray plate which was made from the specimen shows the point at which the abscess broke into the skull, also the defects in the occipital and sphenoidal bones. Nothing pathologic could be noted in the mucosa of the mouth or pharynx, and the tonsils seemed normal, but by cutting deeply into the tonsillar tissue, a large amount of pus was brought to light, especially on the left side. Changes in the musculature of the pharynx near the tonsils were noted, the muscle tissue being slightly involved, but near the floor of the skull much more marked changes were found and much free pus encountered. That explains the absence of bulging of the pharyngeal wall at examination.

One could follow the course of the infection from the left tonsil along the roof of the pharynx so plainly at autopsy, that no doubt can exist that the whole process must be interpreted as having originated in the tonsil. Autopsy also explained why the tonsillitis and the retro- and suprapharyngeal abscess were not recognized clinically. The first symptoms began when the abscess broke through the floor of the skull and exerted pressure on the dura. The duration of the entire illness was fourteen days.

The secretory catarrh of the tympanic cavity was also explained at the necropsy. The auditory nerve was bathed in pus, and it is very probable that a labyrinthitis was induced through the internal auditory canal, and the secretory catarrh of the tympanic cavity is to be interpreted as a collateral edema.

One might interpret the findings in this case as one of primary osteomyelitis of the base of the skull, with consequent gravitation of the resulting abscess toward the tonsils. It would be difficult to say positively whether the case is one of a purulent process which sinks from the floor of the skull towards the tonsils, or one of pyogenic infection arising in the tonsils and extending upwards toward the base of the skull, but there is much to say for the latter view.

In the first place, the presence of streptococcus in the abscess, in the meninges and spinal fluid, because we usually consider osteomyelitis as a staphylococcic mycosis. Then, in the decision of just such a case, the anatomist, in view of his findings, has the decisive word. Again, after a careful perusal of the literature, I find a similar case reported by H. Neuman of Vienna.

V.

REPORT OF CASE OF DOUBLE MASTOIDITIS, WITH PURE CULTURE OF STREPTOCOCCUS CAPSULATUS MUCOSUS FROM THE MASTOID CELLS OF BOTH EARS.

By W. D. Jones, M. D.,

Dallas.

As a general rule, we are guided by the clinical symptoms as to whether or not we operate early in acute mastoiditis. However, there are exceptions. I have in mind a case in which I was called in consultation, which presented quite a contrast to the one I am reporting. In this case the symptoms were vague, with very little tenderness over the mastoid, and only three-fifths of a degree of fever in the afternoon. In the fourth week, symptoms of meningeal involvement developed, and an operation showed exposed dura over the tegmen antri. On the following day symptoms of meningitis were pronounced. A lumbar puncture was made, and a culture taken from the cerebrospinal fluid, in which a few pneumococci were found. Next day the fluid was cloudy, and culture again developed pneumococcus. Lumbar puncture and culture on the third day showed the same organism, but a marked increase in number. The patient died on the fourth day.

In the case I am reporting the patient was very ill from the beginning, all the symptoms were pronounced from the onset, and in all probability only an early operation saved this patient's life. I am convinced that the bacteriology of the infection should be a governing factor as to when to operate in those cases where the symptoms are mild but persistent.

On October 28, 1913, I was called to a nearby town to see Mrs. W. P. H. Family history, negative. Past illnesses: had diseases of childhood, and two years ago had albumin in urine, which was probably an acute condition, as examination shows no albumin or casts at present. Present illness: night of the 24th instant, following a cold and sore throat since October 20th, patient had a severe pain in left ear. On the morning of the 25th she had a chill and some fever; pain in the ear not so severe during the day. On the night of the 25th; pain was so severe in left ear that she was unable to sleep. On the night of the 26th, she had severe pain in both ears, and was given morphin for relief. Patient had fever all next day, the 27th. I was called on the night of the 27th, and saw patient at two o'clock the morning of the 28th. On examination I found the following condition: Temperature 102° F., pulse 96 per minute, respirations 20 per minute. She had the appearance of being very sick, and her expression showed she was suffering intense pain. Tenderness was very pronounced over both mastoids, with bulging of both drum membranes. I made a free incision in both drum membranes, and ordered hot irrigations of saturated solution of boric acid every two hours, with ice to both mastoids. Patient was advised to come to the sanitarium at Dallas that day, and trained nurse was engaged to carry out the treatment. The paracentesis and irrigations seemed to give little relief, if any, and she was given opiates to control the pain. Her temperature ranged from 100° to 103 3/5° F., pulse from 84 to 92 per minute.

On the 29th I received a phone message, telling me she was no better and would come to the sanitarium on the next train. She was admitted to the sanitarium on the morning of the 30th. Temperature 101° F., pulse 92, both ears discharging freely, tenderness over both mastoids, and sagging of the posterior superior canal walls. The nurse reported that since the paracentesis there had been a discharge of a large quantity of bloody serum from both ears.

I had engaged the operating room for an immediate operation, but her husband, who was a physician, insisted that we keep her under observation another twenty-four hours. Irrigations and ice to mastoids were continued, and a blood count and blood culture were made. The blood count showed a leucocytosis of 14,000; and the blood culture was negative. During the night the patient suffered severe pain, and was given a hypodermic of one-twelfth grain of heroin at 2 o'clock a. m. and one-fourth morphin at 4:30 o'clock a. m.

On the morning of October 31st I did a mastoidectomy on both sides. Cultures were taken from the cells of both mastoids, after removing the cortex, and a pure growth of streptococcus capsulatus mucosus developed. Both mastoids were of pneumatic type and filled with pus. All cells were exenterated and wounds were packed with iodoform gauze. Patient was put to bed and a pint of saline was given by Murphy method, and was retained. At 4:30 o'clock p. m. patient had a chill lasting fifteen minutes. Temperature went up to 103° F., pulse 108 per minute, respirations 26 per minute.

Next morning, November 1st, temperature was 102°, pulse 104. Outside dressing was changed, and temperature remained 102°, pulse 104 and 108 all day.

November 2nd, second day after the operation, outside dressing was changed and wound inspected. There was some redness and inflammation around the wound, especially the left, and hot boric acid stupes were applied constantly to both ears. Temperature remained 102° and 103°, pulse 110 to 116 per minute.

November 3rd, both ears were dressed. There was considerable swelling and redness around both mastoid wounds, extending up into the scalp of the left. Temperature ranged from 102° to 104° F., and pulse from 108 to 116 per minute, and at 6 o'clock p. m., twenty cubic centimeters of antistreptococcus serum were injected in left side, and hot saturated solution of magnesium sulphate was applied to left ear.

The morning of November 4th, temperature was 101° F., pulse 104, and outside dressing was changed. There were a few blebs around the margin of the wound on left side, and redness extending up into scalp and front. Patient complained of both limbs aching, and in the afternoon at 5 o'clock, temperature went up to 103°, with pulse 100. Twenty cubic centimeters of antistreptococcus serum were injected in right side. Hot applications of saturated solution of magnesium sulphate continued. Patient had a very good night.

November 5th, temperature ranged from 100 3/5° to 102°, wound was dressed, and inflammation was subsiding in the scalp and around the wound. On November 6th the temperature was normal in the morning, and in the afternoon went to 100°, pulse 78 and 80 per minute. After this the patient made a very rapid recovery.

CONCLUSION.

This case clearly demonstrates the importance of an early operation in a virulent infection of this nature. In this case, operation was performed on the fifth and sixth day.

In regard to the antistreptococcus serum, I cannot say whether it was beneficial or not. However, there was a drop of one degree in the morning and afternoon temperature on the day following.

One would conclude that the mastoid cells were infected simultaneously, or practically so, as the paracentesis afforded no relief, and the mastoids remained exceedingly tender.

Opiates were given against our best judgment, but the patient suffered almost intolerable pain, especially at night.

VI.

SOME OBSERVATIONS UPON THE MODERN MASTOID OPERATION.*

By John Johnson Kyle, M. D.,

Los Angeles.

The indications for the simple or the radical mastoid operation are not always well defined, and in consequence the personal equation of the operator has much to do with the choice of time, except in those cases with symptoms well marked.

In nearly every case of mastoiditis, either acute or chronic, we have a ruptured tympanic membrane. Many surgeons have probably operated for the cure of a chronic mastoiditis in which the tympanic membrane was intact at the time of the operation. In one case I found all the cells, except one, free from any evidence of disease. The one large cell was filled with a dark exudate. This case probably belonged to the neurotic type of mastoiditis, which is rare as compared to the inflammatory or infectious type.

I have had one case of acute double mastoiditis, combined with sinus thrombosis of one side, and complete loss of caloric reaction of both labyrinths with intact drums. The history was, however, that a week previous there had been a discharge from one ear.

Cases of acute mastoiditis do go on to spontaneous recovery, and many sufferers from chronic mastoiditis die from old age; nevertheless, I think it a serious error of judgment for one to treat either condition expectantly, after symptoms indicate the disease. Intracranial complications are so fatal and danger of operation so slight that one is not justified in presuming an acute or chronic purulent mastoiditis will recover without operation. If after a week in a given case of acute purulent inflammation of the middle ear, there persists a slight rise of temperature, with or without swelling or tenderness of the mastoid, and pus comes pulsating from the middle ear, I think a simple mastoidectomy is indicated.

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*Read before the American Academy of Ophthalmology and Otolaryngology, Boston, Massachusetts, October 19, 20 and 21, 1914.

If a temperature, that is, any above 100 degrees Fahrenheit, persists for forty-eight hours after spontaneous rupture or paracentesis, it is advisable to drain the mastoid. A meningitis may come on at any minute and have its origin either in the middle ear or mastoid process. Early drainage of the mastoid is the surest preventive of meningeal complications. Preceding any surgical attack of the mastoid in which brain complication is suspected, a lumbar puncture should be made and cerebrospinal fluid examined. A case of serous meningitis may recover, but from personal experience those with a diffused purulent meningitis do not.

The one symptom in acute mastoiditis that I have come to look upon as very nearly positive, with or without rise of temperature or tenderness of the process, is a pulsating discharge of pus from the middle ear. To get this distinct sign the ear should be cleansed so that a perfect view of the drum can be had. The pulsation is an indication of tension from rapidly forming pus in the antrum and possibly the mastoid process. The more pronounced the tension and pulsation, the more positive the indication for immediate operation.

Pain and swelling of the mastoid is a variable sign. A short time ago I performed a double mastoid operation upon an infant ten months of age. In this child there was no swelling or redness of the mastoid; there was, however, a persistent discharge for a period of three months, daily exacerbation of temperature and mild general sepsis. The absence of some postauricular swelling in an infant so young is unusual. In the above case, both lateral sinuses were covered with a soft necrotic mass and the antra full of pus.

In a few acute cases we have a slight discharge, no other general symptoms other than malaise, or possibly a slight rise of temperature upon exertion. In others, pain in some portion of the affected side of the head with discharge; while exceptionally we find a case with all the classical symptoms: pain, swelling, redness, tenderness, stiffness of the neck muscles, persistent discharge and pinched countenance—symptoms which any one should interpret.

Blood examination should be of value in deep complications where we have a sinus complication or meningitis. Sometimes in a beginning sinus involvement blood cultures are negative. More than one blood culture should be made. A bacteremia indicates infection of the blood stream, and may be present in a case of mastoiditis and due to infection in some other part of the body. Clinical symptoms of a mastoiditis are far more valuable than any blood examination. Acute cases when due to pneumococcus or streptococcus mucosus capsulatus infection, alone or mixed, are as a rule more fulminating and insidious than a streptococcus pyogenes or staphylococcus infection.

It is interesting to contemplate why apparently typical cases of mastoiditis go to spontaneous recovery and others require operation. Why in one case the infection confines itself to the air spaces of the mastoid process and in others spreads to the haversian canals of the squamosa. In those cases of spontaneous recovery the organism is short lived and has a tendency to confine itself to tissues of greatest vascularity.

In operative cases the organisms have a tendency to attack bone structures, sometimes blocking the blood supply of the bone and ending in early necrosis. The morphology of the organism governs the character of the tissue change.

Mastoiditis under some favorable conditions may become epidemic, and is due to the virulence of certain organisms with a predilection to middle ear cavity and mastoid cells. In some cases I have observed the pus from the middle ear filled with microorganisms, and when the mastoid cells were opened the extravasation within contained no bacteria at all.

My one case of mastoiditis from the Klebs-Loeffler bacillus ran a very protracted course. There was much pain in mastoid, little temperature, history of previous sore throat, some tenderness of mastoid and a white bulging drum. Thick yellow pus followed a paracentesis. The mastoid wound was unusually slow in healing, and pain persisted in the mastoid for many days after operation. Pain in the mastoid region following mastoidectomy from any form of infection varies in individuals, and may persist for a number of days after the patient becomes ambulatory. Dry heat, codein and aspirin usually relieves the irritation.

As a confirmatory evidence of the existence of an acute mastoiditis, the value of radiography cannot be overestimated. The findings are as positive as in nasal sinus disease, and even more so. Each mastoid should be photographed separately; by doing so they can be more carefully compared. Not infrequently the extent of infection and area of the mastoid involved can be ascertained. In a case in which the operator is inclined to procrastinate or feel overconservative or in doubt, a radiograph should be made.

The symptoms indicating a radical mastoid operation are not always as well defined as those indicating the simple operation. One symptom, however, stands out preeminent, and that is a chronic foul discharge from the ear. This is indicative, as a rule, of caries, necrosis or cholesteatomata. It may be taken as an axiom that in all cases of a chronic discharging middle ear, regardless of the character of the discharge, a meningitis is always a possibility. Other indicative signs are labyrinthine symptoms, periodical or constant pain on the affected side, exacerbation of temperature and desire for life insurance.

In many cases the pathologic process is confined to the middle ear and antrum and may be relieved by curettement, ossiculectomy or medication. These cases are the exception, and the treatment cannot be other than empirical. With no indications to the contrary, it is a safe rule to do the radical operation in all cases of a chronic discharging ear.

There are only two or three conditions that may counterindicate a radical or semiradical operation in a chronic middle ear and mastoid suppuration. Patients in an advanced stage of pulmonary tuberculosis usually die following either a simple or radical operation. The vitality of the patient at such a time is too low to withstand the shock of the anesthetic, or repair the wound. Infusion anesthesia may be indicated in such cases rather than the American or drop method.

In preparing the patient previous to the operation, more care should be observed in women than in men, on account of the greater tendency to gastrointestinal disorders, especially diseases of the colon.

In the preparation of the site of the operation, it is needless to shave the side of the scalp in proximity to the line of intended incision. We should try to preserve the hair, and not render our patients unnecessarily conspicuous. The postauricular wound usually heals in from one to five weeks; long before the hair, if clipped or shaved from the scalp, reaches its length worn by the patient.

It is a custom with me to paint the pinna and auditory canal and postauricular region well into the scalp with tincture of iodin. If the case is seen the day or a few hours previous to the time set for operation, the iodin solution is then applied. When the case comes to the operating table, if the skin is not unusually sensitive, the iodin solution is again applied. This is the only external preparation. Scrubbing, shaving, bichlorid packs, etc., I think unnecessary.

To prevent the hair from getting into the wound at the time of operation, strips of gauze are cemented along the edge of the scalp with collodion. These strips are easily removed, after the operation is completed, by moistening with ether. After the collodion strips have firmly adhered, sterile towels are bound about the head.

The auditory canal is now, as far as possible, cleansed by irrigating with a warm bichlorid solution (1/5000). Afterward the canal is filled with pure alcohol and plugged with cotton.

The anesthetic used is invariably ether, preceded sometimes one-half hour, if in extremely nervous adults, by one-fourth grain morphin and one-one-hundred-and-fiftieth grain sulphate of atropin. Ether is administered by the American or drop method. On two occasions I have given ether by intravenous infusion with happy results. The solution used was seven per cent ether and ninety-three per cent normal salt solution. We do not like gas-oxygen anesthesia, and this is not said to disparage those who favor this method of anesthesia. Our opinion of this form of anesthesia has been influenced by two nearly fatal results, and bad results frequently observed in medical literature. In an experience of over fifteen years we have had but two deaths from ether anesthesia. Postmortem disclosed one case to be a typical condition of status lymphaticus. We have exercised, however, the greatest care, and in only a few cases have we ever trusted a patient to a man who has not had some experience in the administration of anesthetics. It is only in the beginning that a deep anesthesia is necessary. If the anesthesia has been a prolonged one, we sometimes use oxygen after the operation is completed, to hurry the elimination of residual ether in the lungs. A light anesthesia and rapidity in operating is the sine qua non of a mastoid operation. The less shock the more rapid the recovery.

Speed, consistent with safety, is essential to success. The antrum is reached, we think, more quickly with gouges designed by Alexander and driven by a mallet. The chipping away of bone should be begun with the largest size gouge and in the direction of the spine of Henle, and as we approach the antrum a smaller sized gouge may be substituted; in the hands of the skilled the operation upon the bony structure may sometimes be completed with a mallet and gouges. We should in this operation, or in any other, try to simplify our armamentarium. In the simple mastoid operation, after the cells are completely removed, the posterior bony wall of the auditory canal should be shaved down nearly to the annulus tympanica. In very young children this is not indicated. In adults the healing is simplified by allowing the membranous posterior wall of the auditory canal to drop back into the wound. Previously, however, and to prevent deformity, as much of the external wall of the tip is saved as is consistent with thorough exposure of all the tip cells. Previous to closure, the wound is thoroughly cleansed with peroxid of hydrogen, followed with alcohol. Afterward the periosteum and subcutaneous structures are firmly united with a No. 2 plain cat gut suture, except near the inferior angle of the wound. By careful attention to apposition of subcutaneous structures we avoid, in most cases, a depressed scar. At the inferior angle one or two stitches are usually taken, leaving an opening near the most dependent portion of the mastoid wound, and not larger than one-quarter of an inch, through which a strip of a five per cent iodoform gauze drain or small cigarette drain is gently passed into the wound in the direction of the aditus and antrum. Sometimes the gauze is softened by dipping in warm vaselin, which prevents adhesion to the exposed bone and tissues. We can see no good reason for firmly packing the bony cavity. There is a tendency among some operators to pack the wound too lightly and for a longer period of time than necessary. The less packing the smaller the scar and more rapid the recovery. After the cells are removed the abscess cavity has a tendency to take care of itself, and therefore any artificial drainage is to be avoided. The tendency of a mastoid wound after the cells are drained is to go to spontaneous recovery, if we will leave the wound alone. The cutaneous structures are closed with Michel's clips in patients past the first year of life; if in an infant, the lips of the wound are closed with a ten day chromic catgut. The Michel's clips may be removed in from twenty-four to thirty-six hours. The sooner the clips are removed the less likelihood there is of a scar. The external surface is now cleansed and a layer of gauze saturated with pure alcohol is applied, and over this the usual dressing. In the great majority of our cases we have no postauricular depression, and very little scar at the line of incision, in either the simple or radical operation. A blood clot operation has nothing better to offer except, in a few favorable cases, a more rapid healing.

If the operation is performed in the morning, and on those past infancy, the external dressing is removed in the evening and a new dressing applied. Daily, and sometimes twice daily, the dressing is removed, the auditory canal irrigated with warm 1 to 5000 bichlorid solution, and a warm moist dressing applied about the ear and covered with dry gauze. By taking this precaution we save the patient a great deal of pain and hurry the recovery many days.

The patients are always pleased with frequent change of external dressing, pain is greatly relieved and sleep more assured. The patient is usually up and about on the fourth day. As soon as the gauze strip comes away moistened with serum or slightly tinged with pus, we permit the wound to close. It is unnecessary for the wound in the bony canal to be filled with granulations before the external wound is allowed to close. The treatment of the postauricular wound following the radical operation varies but little from that described above. We do not trouble ourselves with skin grafts.

After one week I try to discard the bandage. The wound is covered with a strip of gauze and cotton, half moon shaped, which fits behind the pinna and is held in position by collodion. If the posterior wound is slow in closing, we pass a cotton tipped probe saturated with phenol as far into the fistulous tract as it will go. One application of phenol is usually all that is necessary. A postauricular fistula may persist for a long time and try the patience of Job before it is cured. Fortunately such a case is rare.

Sometimes where necrosis has been of long standing, or the cat gut fails to be quickly absorbed, healing is retarded by the formation of excessive granulations about the mouth of the wound. Cutting them away does not always stop their recurrence, neither does the application of escharotics prevent their growth. These cases are exposed to air and sunlight as long as possible. The patient may go a whole day with wound exposed. In winter the dry air of the house suffices, and in summer the free warm sunshine is sufficient to dry the granulations. It is remarkable how quickly these cases recover after the bandage is removed and the granulations exposed to the air and sunlight. The value of heliotherapy is given but little consideration by otologists. A treatment so simple and so natural should be applied more often. Air and sunlight are very essential and efficient in healing the middle ear cavity after the radical as well as the simple operation. In the radical operation, as soon as the patient becomes ambulatory, all dressing should be removed from the canal and the ear exposed for as many hours as possible to the rays of the sun. All forms of dressing retard repair. There is practically no danger of any new infection when the reparative process has once begun. A patient should not ordinarily remain longer than a week in a hospital for a simple or radical operation. The expense of a hospital to the average individual is very great, and sometimes eats up most of the money that should come to the physician. As long as the patient is free from temperature and able to be out of bed, there is no good reason why they should not report daily at the physician's quarters for dressing. Cat gut sutures are often a potent factor in retarding recovery. The longest period I recall of plain cat gut remaining unabsorbed was eight weeks.

As to the use of urotropin, we have used this drug in most cases of severe infections of the mastoid in which we suspected a possibility of some brain complications. There is sufficient literature on the subject to prove that the spinal fluid contains urotropin when administered per os to encourage one to use the drug. In young children and even adults the irritation to the kidneys is very great when the drug is given in large doses. In infants the urine will be tinged with blood, and in adults great pain will be experienced upon urination.

As to vaccines, I have come to believe in them after operation, and not before. I have had what appeared positive results from vaccines in acute mastoiditis, only to have a second attack, fulminating in character, come on a few weeks after the ear was apparently cured. Where the antrum was exposed four to six hours after the second attack, it was found to be filled with débris. I am rather skeptical about the efficiency of vaccines in suppuration in closed cavities, such as the nasal sinuses and mastoid antrum and process. If the case is fulminating, and one organism is present in the pus from the canal, I give that vaccine at the operating table, and if more than one organism, I give the mixed vaccines, and they are known as stock. It is a reasonable presumption that autogenous vaccines are more potent than stock vaccines, but unfortunately in the great majority of cases we do not have time for the preparation of autogenous vaccines, and even had we time, our faith in stock vaccines prepared by the Lederle Laboratory in the East or the Cutter Laboratory in the West is greater than in an autogenous vaccine prepared by some one who is not a specialist in such therapy. It would be better in the preparation of vaccines to secure the pus from the mastoid wound rather than the auditory canal, and in virulent cases from the bone chips as well as from the free pus in the mastoid.

The accidental exposure of the dura or lateral sinus in the simple or radical operation, as far as I am able to judge, is free from danger. It is reasonable to presume that in the exposure of the dura or sinus we avoid cutting or tearing the tissue. A meningitis or phlebitis, if it occurs, has had its inception before operation. The dura has a very strong natural resistance to infection, and the resistance is much greater after the free drainage is established. Meningitis or thrombosis are diseases with a predilection to precede rather than to follow a mastoidectomy. Whenever the sinus wall is found diseased, it is my practice to widely expose the sinus so that imperfect drainage cannot produce phlebitis.

The socalled Heath operation has many points to recommend it to the otologist. The removal of the posterior bony wall of the canal down to the annulus tympanicus, with the formation of a flap, for the cure of acute mastoiditis, is not an unsurgical procedure. By so doing we avoid filling a deep cavity with fibrous tissues, prevent the recurrence of mastoiditis, and secure more rapid healing. In the few cases that I have used this method the results have been perfectly satisfactory. The one disadvantage of all flap operations is the tendency to accumulation within the canal of cerumen mixed with débris. Very often cases require attention, at intervals, for many years.

In the consideration of the radical mastoid operation, the preservation of the ossicles, tympanic ring and some of the tympanic membrane, as advocated by Heath, Bondy, Ballenger, Botey, and many others, has given me, as it has most operators, a good deal of concern. We are idealists and are looking for ideal results. It remains a question of dispute as to the advisability of trying to retain the ossicles and tympanic ring, and probably will be discussed for years to come. It is impossible to tell anything of the necrosis of the ossicles until they are removed. Since the incus and some part of the malleus is destroyed in nearly all chronic suppurations of the middle ear, and the chain of articulation broken, the removal of the necrosed ossicles does not jeopardize the hearing. The size and shape of the drum may govern the indication for or against any effort to retain the tympanic ring and ossicles. Where the tympanic membrane is destroyed and the antrum filled with cholesteatomata, it is best to do the classical tympanomastoid operation. If, as far as the eye can detect, the ossicles are intact, the drum membrane not in apposition with the inner tympanic wall, and no symptoms that would indicate the possibility of a labyrinth irritation or meningitis, an effort may be consistently made to save the drum membrane and ossicles.

I presume I am subjecting myself to a good deal of criticism when I say that I seldom ever pay any attention to the orifice of the eustachian tube in the radical mastoid operation. The tube as a factor in prolonging any suppuration after the radical mastoid is, we think, overestimated. The cause of any failure to secure a dry ear is, as a rule, outside of the eustachian tube. Advisedly speaking, the cause is a disease of the bony structure which surrounds the antrum, and particularly along the aditus ad antrum, that retards recovery.

VII.

HEMORRHAGE FOLLOWING REMOVAL OF THE FAUCIAL TONSIL.

By F. F. Agnew, M. D.,

Independence, Iowa.

The timely warning given by Virginius Dabney concerning hemorrhage following "Radical removal of the faucial tonsil," published in the December number of Annals of Otology, Rhinology and Laryngology, should be given heed and the tonsil operation made strictly a hospital operation, where the patient may be observed closely until all danger of complication is past, and should be performed only by those equipped to meet such complications, should they arise.

At the time of publication of Dabney's paper I was having an experience of this kind, the report of which I withheld until the result was complete.

Patient, Hazel K., six years old, was brought to the hospital on November 25th for removal of tonsils, which had caused much trouble. Child slender and rather pale, mouth breather from adenoid obstruction. Family history negative, except that one year ago mother had severe hemorrhage during abortion of unknown cause. Conditions seemed no different from those surrounding other similar cases.

Operation at nine o'clock in the forenoon. Tonsils removed by blunt separation of pillars and completed with cold snare. Nasopharyngeal space curetted for adenoids. Bleeding slight, and patient put to bed in apparently good condition. Two hours after operation there was sudden severe hemorrhage of large amount arterial blood, which was controlled by nurse, who applied gauze soaked with adrenalin to fossa and at the same time compressed carotid artery. I saw her in about ten minutes and put her on table for examination. The hemorrhage was too profuse to permit of ligation and a tonsil clamp was applied. Patient semiconscious, extremely pale, with widely dilated pupils and no pulse at wrist. Was placed in bed with feet elevated, and oxygen given with salines per rectum and subcutaneously. There was gradual recovery, and at the end of twenty-four hours the clamp was removed. The fossa looked clean and there was no bleeding. On the fifth day she had recovered sufficiently to be taken to her home, five miles in the country.

On the ninth day following the operation she had retired and been asleep for one hour. The father, while putting another child to bed, was attracted to her bed by a gurgling sound, and found her bleeding profusely from the mouth. The mother, who possessed much presence of mind, compressed the carotid as she had seen the nurse do. Yet the bleeding was quite as severe as at the time of operation. On my arrival a clamp was immediately applied. Same restorative measures were used as before, the patient responding well. With a nurse in charge, the clamp was left thirty-six hours, when she was again brought to hospital. Examination of throat showed a space one-third by one centimeter in the upper third of the posterior pillar of the fossa, where the muscular fibers were torn away, and presenting in this space was an artery about the size of a quill, which I believed to be the internal carotid in an anomalous position, the walls of which appeared sloughy. Deeming it unwise to temporize or attempt ligation through the mouth, as further hemorrhage seemed imminent, I decided to ligate the common carotid, which was done at once. The wound became infected and was slow in healing, but closed two months ago, leaving but a small scar The child is in splendid health and attending school regularly.

Having had such an experience, and three years ago a death on the table from chloroform before operation was well begun, I feel that to emphasize the warning of Dr. Dabney is justifiable, and that this operation should be placed in the class of major operations, where it certainly belongs.

VIII.

REPORT OF TWO CASES OF FOREIGN BODY IMBEDDED IN THE WALL OF THE PHARYNX.*

By Charles N. Cox, M. D.,

Brooklyn.

Case 1.—J. W., male, aged forty-four years, came to my office February 17, 1910, complaining of pain and purulent discharge from the right tonsil. He said he was subject to attacks of quinsy; that he had his tonsils removed fourteen years previously, but that he had continued to have attacks. About two months previous to his first visit to me he had more of his tonsils removed, since which time the discharge and pain from the right tonsil had been continuous.

Upon examination I found a heterogeneous mass of soft palate, pillars, tonsil tissue, and cicatrices on the right side. Pus was exuding from two or three sinuses—most from one at the apex.

I put a bistoury into the sinuses and slit them open. This relieved the patient of pain, and the discharge became very slight, but still persisted.

March 29th I endeavored to clear and drain the supratonsillar fossa by removing remains of velar portion of tonsil with a punch—not an easy task, I can assure you, on account of loss of landmarks and great distortion.

A few days later, I laid open a deep sinus, apparently reaching bottom. I then curetted and swabbed out with tincture of iodin. This seemed to end the trouble, and in a few days the patient passed from under my observation.

On November 11th, following, he consulted me again, stating that he had been very comfortable since last spring (seven months previously), but that there had been a bad taste and odor frequently of late. This morning he felt something in the throat, back of the palate, and this afternoon he expelled from the throat this piece of drainage tube. He then informed me that during a particularly bad attack of quinsy in May, 1909, his physician, a general practitioner, after incising the abscess, had put in a drainage tube. In a day or so following, the doctor, being unable to find the tube, concluded the patient had swallowed it. Another one was introduced and removed in a day or two.

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*Read at the Eastern Section of the American Laryngological, Rhinological and Otological Society, January 9, 1915.

I found, upon examination, a sinus leading through the supratonsillar space and emerging at the lateral wall of the pharynx, behind and above the right posterior pillar.

The discharge and all symptoms ceased in a few days, the sinus closed, and he has had no trouble since.

It seems almost unbelievable that a foreign body such as this should have remained so long without being discovered. Yet its presence was not evident or suspected two months before I saw the case; nor was it manifest in any of my own cutting, probing or curetting.

Case 2.—E. M., male, aged twenty-three years, was brought to me by his family physician, May 5, 1910. The patient had had no throat symptoms whatever, but the doctor discovered, quite accidentally, some foreign body in the nasopharynx, barely showing below the velum.

The mass had the appearance of a calculus; it was hard and firmly imbedded in the right lateral wall of the pharynx, and could be seen just at the edge of the soft palate. I seized it with forceps and gently rotated it until extraction was possible. When this was accomplished it was found to be a thirty-two caliber bullet. No bleeding followed. A large, crater-like cavity was left, with indurated, infiltrated walls.

When patient was asked if he had ever been shot, he replied: "Why, yes. Fourteen years ago I was accidentally shot at close range by a playmate." The ball had entered through the skin over the left canine fossa, where a small scar was still to be seen. The patient further stated that several teeth were loosened, and that there was a small hole in the roof of his mouth for a short time after the shooting, but no sign of it could be found.

The wound of entrance, the loosened teeth, and the palate lesion—the only ones of which the patient was cognizant—promptly healed, and the incident had been forgotten until, fourteen years afterward, the offending missile was discovered, quite by accident, and removed.

IX.

TWENTY-FIVE CASES OF VINCENT'S ANGINA SUCCESSFULLY TREATED WITH SODIUM PERBORATE—SPECIAL REPORT OF THREE CASES.

By H. H. Stark, M. D.,

El Paso.

I have been struck with the lack of information gained from the textbooks on the subject of Vincent's angina, especially the treatment. Osler (1912) does not treat it as a distinct disease, but mentions it only in connection with diphtheria. Strompel (1913) does not mention it. Kerr mentions it, but suggests nothing in the way of treatment. Ballenger, second edition, does not mention it; he takes it up in the third edition, but gives nothing new on the treatment. Brown, "Oral Diseases and Malformations," does not mention it. In the other works in which it is mentioned, the treatment is given principally along the old lines, such as tincture of iodin, silver nitrate, potassium permanganate, etc. Judging by the recent literature, the tendency at the present time is toward the use of local applications and salvarsan. I therefore think it may be acceptable to the profession to call their attention to a series of twenty-five cases treated by myself in the last two years, with the observation of at least that many more, which were treated by my colleagues, with a report on three of the cases showing special interest.

In my observation of these cases I have been particularly struck with the lack of ability on my part to differentiate the gross lesion from that of syphilis and diphtheria, and believe with the authorities who agree on the diagnosis being made by the finding of the spirochetæ and the fusiform bacilli in smears taken from the lesion. In all of these cases reported these microorganisms have been found present, with one or two exceptions. In three or four cases there was an apparent absence of the spirochete, which may have been due to faulty staining technic, as they sometimes do not take the stain well. All examinations were made by Dr. Willis W. Waite, of the Crouse laboratories, so I feel sure of the diagnosis. I also feel sure that this is the only accurate way to differentiate this disease from the others of like gross appearance.

In the handling of these cases I have noticed that the disease is most often confined to softer and more easily invaded tissues, the tonsil being the seat of the majority of infections. Following this have been the hard palate and the gums, followed by the tongue, and in some cases an invasion of the bone, the bone infection usually coming in children. It takes on two distinct forms: one, where the tissues are necrotic with a slough and exudate; the other, where there is very slight exudate, and the process, if confined to the tonsil, being apparently a clean-cut surface, with progressive loss of substance. This form, I believe, to be responsible for most cases of necrosis of the tonsil that have been reported. I feel sure that one of my cases, diagnosed by me as tonsil necrosis, several years ago, in which there was no microscopic examination made, and in which there was a complete loss of tonsillar substance on both sides, without invasion of the pillars, to have been this disease. The second form of this disease is sometimes found in the tonsillar crypts, in which we can see no loss of substance, and runs a chronic course. The most noticeable feature of all forms is the persistent aching pain complained of by the patient.

TREATMENT.

Up to two years ago I had treated all cases of Vincent's angina with every conceivable substance mentioned in the textbooks, with uniformly slow recovery and relief from pain. Two years ago, Dr. Henri Letord, a dental surgeon, called my attention to sodium perborate ("New and Non-Official Remedies," 1912, page 226), with which he had recently treated a case of Vincent's angina of the gums. I immediately began the use of this substance, with uniform success. A common mistake is considering perborate of soda to be the same as the common borax of commerce. The perborate splits up in the mouth, forming nascent peroxid of hydrogen. It is usually prescribed in a powder, two teaspoonfuls dissolved in a glass of water, this making a saturate solution, which is to be used frequently as a mouth wash and gargle. It is exceptional to find a case in which the pain is not relieved within twenty-four hours and a cure within a short time.

I herewith report three cases that have been of special interest to me, illustrating some of the points mentioned above.

Case 1.—The first case in which sodium perborate was used was that of a Mexican woman, about thirty-five years of age, in the charity clinic. She came in with a history of having had trouble in her mouth for about three months, the pain having been so severe for the last week that she could not eat or sleep. On examination it was found that both tonsils were affected, the tongue fissured, with small ulcers on the buccal side of the gums; smear taken, and fusiform bacilli and spirochetæ found. Diagnosis, Vincent's angina. She was placed on a mouth wash of sodium perborate, with no other treatment. Within twenty-four hours the pain was so much relieved that she was eating and sleeping fairly well. The treatment was kept up for three days, with marked improvement; then changed to borax, thinking perhaps that the borax salt had the specific effect that zinc sulphate has in Morax-Axenfeld bacilli of the eye; the pain promptly returned, and the process was again progressive. She was then treated with nitrate of silver solution, iodin, chromic acid, and potassium permanganate, successively, but each of these failed to relieve the trouble, when she was again put on sodium perborate, and went on to an uneventful recovery. This case was, evidently, one of the slow progressive type, with little exudate, and during the progress of the disease there was practically a total loss of the tonsillar substance on each side, without invasion of the pillars.

Case 2.—American child, aged three years; gave a history of having sore mouth for six weeks; pain was intense, for the last four days and nights unable to sleep. Examination showed a large patch on the hard palate, opposite first molar tooth, covered with a gray exudate; smear showed fusiform bacilli and spirochete. Diagnosis, Vincent's angina. The exudate in this case was not removed. The child was immediately placed on a mouth wash of sodium perborate—about ten in the morning—and used a number of times that day. The pain was relieved so much that she was able to sleep that night. The ulcer completely healed in two weeks. This case illustrates one of the type of cases that is very difficult to make a diagnosis in the gross lesion, differentiating it from syphilis and diphtheria. In addition to the microscopic findings, the diagnosis was made by the intense pain caused by the ulcer.

Case 3.—Mexican child, aged three and one-half years, referred from the County Children's Clinic; gave history of having had trouble with mouth for three months; unable to eat or sleep within the last few days. Examination showed right side of face swollen; had ulcer on buccal side of right upper gum as large as a quarter, covered with exudate; breath very foul, and child apparently suffering great pain. The patient was immediately put on a solution of sodium perborate without removing any of the exudate, and was not seen again for two days. On returning found pain practically gone, general condition of the mouth much improved. Returned again in three days, when, on examination with a probe, it was found that where the exudate was removed a piece of bone was uncovered and movable, which on being removed brought with it the upper molar tooth, a portion of the alveolar process, and the germ of the cuspid, in one piece. The use of perborate of soda was continued, and the case went on to uneventful recovery.

This illustrates one of the cases where the process had gone on to an invasion of the bone, due, no doubt, to the nonresistant power of the soft tissues of the child. I think with further investigation it would be found that the microorganisms of Vincent's angina are not confined to the mouth, but may be conveyed to most of the tissues of the body.

CONCLUSIONS.

Vincent's angina is a far more common disease than it is given credit for being. The diagnosis is difficult in gross lesions, and in suspected cases there should be an examination microscopically for the combined spirochetæ and fusiform bacilli. That sodium perborate in my hands has given me uniformly good results. It is a simple remedy, without danger; will ease pain promptly and cures within a short length of time.

X.

THE OPERATION OF CHOICE IN MAXILLARY SINUS DISEASES.*

By George Paull Marquis, M. D.,

Chicago.

In presenting this brief paper to you it is not my purpose to burden the society with a treatise on the treatment of empyema of the maxillary sinus nor the indications for operation or technic of the various operations, for all of these subjects have been thoroughly covered before this society in previous meetings, but I propose to point out a few of the advantages, and at the same time mention the only disadvantages that I know, connected with the operation devised by Prof. Alfred Denker of Halle, and which goes under the name of the Denker operation.

To some extent it will be necessary, for the purpose of comparison, to mention the various methods which have been suggested by other authorities, in order that we may see wherein the one or the other method is superior.

To my mind the question of the greatest importance which is to be decided in the choice of a particular operation is: Which will give the patient the greatest probability of a cure? And this naturally must be answered by the operator after weighing the following points:

(a) Which method will permit him to do the most thorough work?

(b) By which method can he gain access to each and every part, depression and bay in the maxillary sinus?

(c) By which method can he not only gain access to but also inspect each of these parts?

(d) Having cleaned out the sinus, which method is followed by the most rapid healing?

(e) Following which method are the parts more nearly in their normal relation and the antrum least liable to reinfection in the future?

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*Read before the Chicago Laryngological and Otological Society, October 29, 1914.

(f) Will the operation in question be followed by unpleasant or even serious symptoms, such as localized areas of anesthesia or severing the nerves, occlusion of the nasolacrimal canal, facial deformity, fistula into the mouth, etc.?

As the Denker operation is never resorted to except in chronic cases, we shall pass over all the various methods of procedure in the acute and subacute cases and come at once to a comparison of the methods employed to relieve the chronic case.

The simplest of these is the one devised by Krause—and later improved by Mikulicz—Hajek, Menzel and others.

This, as you know, consists in amputating the anterior third of the inferior turbinal and making a large opening from the inferior meatus to the antrum.

There is one very decided advantage in this operation over all others—the ease with which it is performed; but beyond that and the fact that it allows thorough washing out of the sinus, it has nothing to recommend it.

I realize fully there are a number of cases where all that is necessary is to make a large opening and employ frequent washings to effect a cure, and to this class of cases the Krause operation is particularly adapted; but where we have a case with polyp formation, localized areas of bone necrosis, etc., the mere establishment of drainage will not suffice—the offending parts must be thoroughly cleaned out. The Denker operation opens a wide field of view and allows one to proceed under direct vision rather than scraping blindly in the dark, as is sometimes done in the Krause procedure.

Then again the Krause sacrifices a part of the inferior turbinate. This was also done in the original Denker, but as now practiced by him the turbinal is preserved.

Cordes of Berlin was one of the first to advocate the preservation of the turbinal in the Denker operation, and he considers the operation with this modification the most satisfactory and successful method thus far advanced.

In short, the Krauze-Mikulicz, in the light of a socalled radical operation, has almost nothing to recommend it. In the way of establishing drainage and permitting lavage of the cavity, it has its place in the list of operative procedures, but has no value that would even let it be compared with the Denker.

The operations answering some or all of our requirements as to indications are known as the Kuster Desault, the Luc-Caldwell, the Boenninghaus, Friedrich, Kretschmann, Canfield, Denker. Comparing the points of superiority in these, we find the Kuster Desault does not compare with the Denker in the field to be inspected; then, too, this method maintains an opening into the mouth which not only subjects it to constant reinfection, but the patient's appetite is decreased, and all of the unpleasant symptoms of pus draining into the mouth are experienced. The canula, which has to be worn, acts as an irritant, and before long the opening is encroached upon by granulations. The method has all the disadvantages of any of the radical operations and none of the redeeming features of any of them.

The Luc-Caldwell is probably the most universally performed of any of the radical operations on the antrum, and has proven successful in the hands of a great many operators.

In considering a few of the relative advantages of this and the Denker we find:

"Access to all parts of the cavity for inspection." We know there are in the maxillary sinus a number of bays or depressions. Especially is this true of the anterior angle; and this part is practically inaccessible to inspection by any method except the Denker. It is true the Luc-Caldwell has a large lateral opening, but that does not permit of inspection of the anterior angle, the very part that is removed or thrown into direct communication with the nose by the Denker.

As to the ease with which the methods can be employed, it is naturally one of opinion; but I am free to say that in my own experience, and after watching a number of others perform both operations, the Luc-Caldwell is more difficult than the Denker.

Concerning the next point of comparison, that of relative degree of normality of the structures and probability of reinfection, the Denker far surpasses the Luc-Caldwell; for in the latter the chief point of advantage, as put forth by its supporters, is the large opening into the sinus from the nose and the easy access after resection of a portion of the inferior turbinal. But this very act weighs against the operation under this particular consideration, for the structures are certainly less normal with the part of the turbinal removed, and there is greater liability to reinfection with the protecting turbinal gone.

One of the strong points in favor of the Denker is the maintaining of the nasal structures, i. e., the turbinates, intact.

With regard to the rapidity of healing, we have again to give precedence to the Denker.

Hajek states, in describing the Luc-Caldwell operation, that months, sometimes even a year, is necessary for the sinus to completely heal.

In a series of Denker operations the longest time I have seen until complete healing had taken place was thirty-three days; the usual time is about three weeks.

This can be explained in two ways. With the cavity open to thorough inspection, the removal of all diseased parts can be more completely carried out, which would naturally facilitate healing rather than if a focus of suppuration were left to continue the discharge and retard complete recovery.

Then again the covering of the floor with the membranous wall of the nose, as practiced by Denker, reduces the time necessary for healing by a decided margin. Objection has been raised that this flap would not unite, but would curl up and slough, thus retarding, instead of promoting, the healing. I must confess that I too was formerly of this opinion; but a series of cases has convinced me that I was wrong, and that if the bony cavity is completely denuded, the membranous flap will readily adhere and greatly lessen the time necessary for complete recovery.

Robertson divides the flap into four portions, folding them so as to cover the four bony surfaces of the opening. He claims by this to prevent the opening from ever closing, as the entire bony orifice is covered. I have had no experience with this method, so cannot testify as to its worth. But I should think there would be more danger of the small flaps curling up. And as to the closing of the opening, which he says this prevents, I have never seen one close following a Denker with the single flap turned back on the floor.

As to the sequelæ, there may be some slight advantage in the Luc-Caldwell, if my conversation with operators is borne out.

I have found with the Denker that the nerve supply to the front teeth as far as the bicuspid is interfered with. This is readily understood when we consider the distribution of the anterior and posterior dental branches of the fifth nerve. The anterior dental is given off from the infraorbital while in the infraorbital canal, and passes down through the substance of the superior maxillary bone in a special canal in the anterior wall of the antrum and communicates with the posterior dental. Filaments are distributed to the canine and incisor teeth, and others to the lining membrane covering the forepart of the inferior meatus.

The Denker operation, removing as it does the anterior wall of the antrum and the apertura pyriformis, cuts these filaments and causes a loss of sensation in these teeth.

I can see, where the opening is made into the antrum through the canine fossa and the anterior wall left, that one would escape this disagreeable complication.

I have also had one other unpleasant experience, in that the infraorbital nerve came through a canal unusually low down on the superior maxilla, and I probably removed the wall of the antrum a little too high—at any rate, I had a numbness of the cheek and lip following the operation. This I have seen on only one occasion, although the numbness of the three front teeth has occurred in all my cases. One would expect an occasional injury to the tear duct with a probable stenosis resulting, but a survey of the literature reveals only three cases. One reported by Hajek, one by Koffler, and a third by Skillern.[7] I have not seen this complication in any of my cases, either in the Denker or Luc-Caldwell method, though I must confess my experienec in the latter method is somewhat limited, as I have discarded it entirely for the Denker.

The Boenninghaus method is practically the same as the Luc-Caldwell, except that in addition to laying back the nasal membranous wall into the antrum, he tampons the membrane around the opening in the canine fossa into the antrum, and maintains an opening from the nose through the antrum into the mouth. He claims by this method to be able to keep the field under observation throughout the entire process of healing; but the constant irrigation that is necessary and the large opening into the mouth with the drainage there, is such a drawback that I think it is not to be compared with the Luc-Caldwell, let alone the Denker.

Friedrich was really the first one to hit on the idea of the anterior angle of the antrum by removing the wall of the apertura pyriformis, but he made his initial opening through the skin along the external angle of the nose, and the attendant scar makes this operation less advisable than the Denker.

Kretschmann followed the idea of Friedrich, but made the incision from the mouth, under the upper lip. However, he did not remove the anterior wall for fear of deformity.

Denker now joined the Friedrich with the Kretschmann, and making the incision through the mouth he removed the anterior wall.

Canfield has practically the same operation, except that he makes the incision through the nose. The results are the same as the Denker, and the operation is the same except the incision; so that the only comparison of these two methods is, which will allow better access to the field of operation; and I am of the opinion that the Denker will allow greater retraction of the soft parts and give a larger field in which to operate than the Canfield.

Skillern has recently come forward with a very effective and at the same time simple operation. He makes a vertical incision in the nose anterior to the inferior turbinate. He then excises an elliptical strip of membrane and proceeds to free the membrane from the nasal wall, and also the periosteum from the anterior surface of the superior maxilla. With the pyriform aperture now exposed, and the lateral and anterior surfaces of the bone freed from its coverings, he removes the bony ridge of the pyriform aperture, and continues the opening on to the anterior surface until he has a sufficiently free opening to give him easy access to the cavity. He then removes the lateral wall in the same manner.

After the sinus is cleaned he packs it for several days, and does his dressings through this nasal opening, using cauterizing methods to prevent its closing before the healing is complete.

This operation has in its favor:

1. It is easily performed and can be done under local as well as general anesthesia.

2. It gives a good field of observation—better than the

other intranasal operations, with the exception of the Canfield.

For the cases of empyema without polyp formation or bone necrosis, it should afford as good a result as the Denker or any other operation, and is certainly more easily performed; but where we have either of these conditions present, this operation does not allow the complete inspection of every bay and depression in the sinus that the Denker affords. It is true, we can accomplish much more since Holmes has given us his very valuable nasopharyngoscope; but even with this we have a reflected image, while in the Denker operation we have a direct view of the entire cavity.

To sum up the advantages of the Denker: Under each one of the standards of comparison it is superior to all the others except the Canfield. It apparently gives a larger field, through retraction of soft parts, than this latter one. The only disadvantage that can be brought against it is the loss of sensation in the three front teeth. How permanent this is I am not able to state, as all but four of my cases have been lost sight of. These four have been operated within the last year and still have the numbness referred to.

I am not so sure but that the idea of Kretschmann, in leaving a small part of the anterior wall and resecting the entire nasal wall, might accomplish the same result and spare the sensation in these teeth.

XI.

THE DIFFICULTIES OF CLOSING A PERFORATION OF THE DRUM MEMBRANE IN CERTAIN CASES OF ACUTE SUPPURATIVE OTITIS MEDIA.*

By Gorham Bacon, M. D.,

New York.

At a time when there is so much discussion about and interest in operative work in otology, I feel a certain amount of hesitation in presenting this subject before the section of otology, although a most important one.

Anyone who has had much experience in treating aural cases will at times have under observation a case of acute suppurative otitis media in which it will seem almost impossible to close the perforation in the membrana tympani. The cases usually begin with or without any pain, and the inflammation being quite severe, the drumhead ruptures spontaneously, and generally before being seen by a specialist.

The following cases are a few of those that have come under my care:

A young man, aged eighteen years, in July, 1910, complained of a sudden fullness in his right ear, and in a short time noticed a serous discharge. There was little if any pain, and as he was in such good health he did not consider it necessary to consult a physician, as the discharge ceased in a few days. About six weeks later I saw him for the first time, and although he told me that his ear gave him no trouble, I found, after removing a few drops of pus, a small perforation in the posterior and inferior quadrant of the drumhead. As he was going away I advised him to syringe his ear, and prescribed some astringent drops. After a few days' use of these drops, the discharge becoming quite profuse, I immediately changed to the socalled dry treatment. I first, however, touched the edges of the perforation with a very weak solution of silver nitrate (three grains to one ounce), and then insufflated boric acid powder. The discharge immediately became so much less that in a week's time, by following this treatment each day, the perforation closed.

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*Read before the New York Academy of Medicine, Section on Otology, November 13, 1914.

In the second case the patient came quite irregularly, and when the discharge ceased, discontinued her visits for some time. When she returned, however, I found a fairly good sized perforation, linear in shape, in the posterior portion of the membrana, but there was no discharge. I treated her in the same way, by touching the edges of the perforation with nitrate of silver, insufflating powders, and at times applying a small disc of paper over the perforation.

The third case was a long and tedious one, and the treatment extended over many months. The patient, thirty years of age, on October 3, 1911, accidentally punctured her drum membrane with a hair pin. She consulted a physician, who washed out the auditory canal and gave her some drops, and when I saw her about a week later she had an acute suppurative inflammation of the middle ear. Under the use of astringent drops the perforation seemed to grow larger and the discharge did not decrease in amount. The insufflation of powders was then substituted, and in a comparatively short time the ear was absolutely dry, but there was a large perforation in the posterior inferior portion of the membrana, involving about a quarter of the entire drumhead. Solutions of nitrate of silver were used to touch the edges of the perforation, and discs of paper were applied and left in situ for a long time, but when removed the perforation was as large as ever. It was interesting to note that the hearing was much improved when the paper disc was in position. Politzer says that "an operation for the closure of a perforation should be undertaken only if the hearing distance is thus increased or at least not diminished." I do not agree with this statement, for I much prefer to close a perforation with cicatricial tissue, even if there should be some diminution in the hearing, provided the case were fully stated and explained to the patient.

As the perforation in this case did not show any tendency to heal under the use of the silver nitrate solution or the paper disc, I tried a method advocated by Politzer, and I met with complete success. But not until the first week in April, six months after the patient first came to my office, was the membrana entirely closed with new tissue, although partly adherent to the inner wall of the middle ear. The tinnitus disappeared, the patient could hear a low pitched voice at a distance of twenty feet, and the whisper at twelve feet. The treatment which I employed in this case was the cauterization of the edges of the perforation with trichloracetic acid, as recommended by Okuneff in 1895.

The method of Gomperz, as given in Politzer's book, is as follows: A piece of cotton soaked in a ten per cent solution of cocain is inserted in the perforation and allowed to remain ten minutes. Cotton applied to a probe is then dipped in a concentrated solution of the acid and the excess wiped off by means of a small piece of dry cotton. "A white eschar forms, on the separation of which it is seen, even after one or two applications, that the perforation has grown smaller." The cauterizations should be repeated at intervals of from four to eight days; the number of applications varies according to the size of the perforation, and is generally from three to fifteen.

I followed out practically all the above suggestions, except that I substituted a four per cent solution of cocain for the ten per cent solution, and insufflated boric acid powder after applying the acid. I feel very enthusiastic about this method and have used it successfully in other cases. It seems to me to be particularly indicated in all old dry perforations, where, according to Politzer, "the most frequent anatomic cause of the persistency of perforations is the growth of the epidermis of the external layer of the membrane over the margins of the orifice into the tympanic cavity, thus preventing the formation of a cicatrix." "This procedure," says Politzer, "is contraindicated when the membrana tympani is defective in its entire extent, in perforation of Shrapnell's membrane, and in cachectic individuals." In the first two cases the perforations were smaller, and the application of silver and the use of powders and the paper disc, as advocated by Blake, effected a cure; but in the third case nothing seemed to be of any benefit until I tried trichloracetic acid.

Blake's method of applying a disc of paper a little larger than the perforation seems to be useful in only a limited number of cases, viz., those in which the perforation is small and the inflammation has subsided and there has been cessation of the discharge, the external surface of the drumhead having resumed a normal condition. It may also be applied to advantage in cases of rupture or mechanical injury, the paper dressing keeping the edges of the wound in apposition. Blake uses writing paper, and the sizing used in finishing the paper, when moistened, is sticky enough to make the paper adhere to the membrana tympani. Such a disc is best introduced by means of a probe tipped with cotton and dipped in water so that the paper adheres to the moistened cotton until it comes in contact with the membrana tympani. The disc of paper should then be pressed firmly into position by a cotton holder tipped with dry cotton.

Milligan recommends the application of a small disc of salicylic acid plaster to the perforation, which sets up a certain amount of local irritation, but I have not as yet tried this method.

XII.

OPERATIVE TREATMENT OF CLEFT PALATE.*

By John E. MacKenty, M. D.,

New York.

In presenting this subject, I am well aware that a small library would not contain the mass of literature at present surrounding it. My apology is that, of necessity, every operator in this discouraging field must view it from a slightly different angle, and thus may add an idea or two to its betterment. That so few surgeons are actively interested in the correction of this deformity may be due to the feeling that the last word has been said; that the operative treatment has reached its limit of perfection, and withal a large percentage of failure remains—not so much cosmetic, perhaps, as functional. For, in spite of a well accomplished operation, correct speech does not always follow. This latter failure is not so evident among the well-to-do as in the poorer classes, from which a very large percentage of our cleft palates come. It sometimes takes years of persistent teaching to make the surgically cured palate functionate, and the uneducated poor have not the intelligence, the time or the money to follow this course of training. Then, there are the cases living in the country districts, where proper training is not available. My experience convinces me that the percentage of speech failure is much larger than that of surgical failure. In my cases operated on after the tenth year, speech improvement in many cases was negative. Where the Lane operation was done, or where there was much cicatrization and contraction of the soft palate, speech was but slightly improved at any age. Nor can I see much hope for such cases in that direction. Where operation was done at an early age (in the first or second year), and the soft palate was carefully preserved intact, I have had some very satisfactory results in speech. Therefore, I would here set down two rules: First, that the operation be completed before the end of the second year, and second, that all operations that split or deform the soft palate in any way should be done only as a last resort.

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*Candidate's thesis, presented before the American Laryngological Association, 1914.

The operations which have for their object the crowding together of the separated maxillæ in infancy, though attractive in theory, and at times showing excellent results in practice, have had in the hands of many operators too large a mortality to be undertaken in a routine way. Besides, they are applicable only to cases with complete clefts (in which hare lip is nearly always present). In this type of case the early closure of the lip exerts a strong reducing effect upon the cleft, narrowing it to a point where a safe operation can be done, thus, to a considerable extent, eliminating the need of the more dangerous operation. I have observed that the eruption of the teeth approaches nearer to the normal when the closure is brought about by gradual lip pressure. The complete cleft is rarely as difficult to close as the incomplete one, in which this type of operation is not applicable. Here I may state a third rule: Close the hare lip as soon after birth as the child's condition will justify. If the premaxilla protrudes so that the lip cannot be closed over it, fracture it and wire it to the arch at the same time. If the lip can be closed over the displaced premaxilla without undue tension, do not fracture the premaxilla, since the lip pressure will do the moulding much more perfectly than can the surgeon. In a year or less the cleft will have diminished and the premaxilla will have, in many cases, taken up its place in the arch. Then close the cleft in the palate. No one operative method can be depended on in all cases. Each case must be treated with a full knowledge, on the surgeon's part, of the merits and defects of all the methods advocated. In secondary operations much ingenuity is required in reaching or approximating a satisfactory result. In some of these the problem is indeed hopeless. Especially is this true after failures in the flap turning operations (e. g., Lane's), where the soft palate is destroyed or so cicatrized that nothing further can be attempted.

Langenbeck's method, with modifications, has, in my experience, been applicable to the great majority of cases. In this operation the soft tissues are separated from the bone, brought down and united along the free edges of the cleft. It is important that the attachment of the soft tissues to the posterior edge of the rudimentary palatine processes be thoroughly cut away in a lateral direction, else the palate will not fall into position. That it in no way injures the soft palate has made this operation deservedly popular for years, and should give it first place in our choice, since when carefully carried through, in the very young, we are justified in hoping for perfect or improved speech. Arbuthnot Lane, modifying Davies-Colley's flap turning operation, gave us the Lane operation. It is a most ingenious and apparently satisfactory method if the closing of the cleft were the only consideration. But knowing that the soft palate is a most important factor in the mechanism of speech, and not simply a partition between the nasal and buccal cavities, we must admit that the Lane operation leaves much to be desired. It restores the form but not the function, and for that reason must always remain a method of second choice. It gives the largest percentage of complete primary closures, and is not difficult of accomplishment to one experienced in this kind of plastic work; yet when it fails it is liable to be an utter and irreparable failure. The palate is so split up by the operation that, if sloughing occurs, it is literally shot to pieces. On the other hand, there is no operation which gives such good prospects of a closed palate after failure in other directions. In one of my cases on which three former operations had been done, I succeeded in getting a very respectable looking palate by the Lane method. In very wide clefts with a flat arch it may be the only operation possible, and should be done in preference to the Langenbeck, since, in such cases, the latter operation involves too much tension and side cutting of the flaps to give a reasonable assurance of success.

It is my object to set down here my experience in ninety-two cases of cleft palate, extending over a period of fifteen years, and to give in detail the technic now employed and to present for trial two new devices employed by me during the past six years.

Of these ninety-two cases only sixty-four are available for statistical purposes. (See appended table.)

To operate immediately after birth, as advocated by some, seems to me a questionable procedure. Those favoring it hold that normal nursing is established by the closure of the palate and lip. This is true when the patient survives the operation, but the mortality is prohibitive. The feeding of an infant with a complete cleft palate and lip is very often a difficult matter. The child should be carefully weighed before and after nursing, to ascertain if any milk has been taken. Where the weight shows deficient feeding, then spoon feeding, if possible with the mother's milk, should be instituted. In the event of this failing, a small catheter should be passed gently into the mouth of the esophagus and the milk poured in. Many of these children die of starvation from neglect of the above precautions. In from four to eight weeks after birth the lip and premaxilla can be operated on under a very carefully given chloroform anesthesia. One week later, the child may be put on the breast. It is well to encourage nursing from birth, even if no milk is extracted, as the salivary gland secretion is thereby stimulated and the act of nursing is practiced and retained for future use. It also helps to maintain normal lactation.

The age at which the palate should be closed must be determined by the condition of the child. It is quite safe and good practice to operate on some a few months after birth, but in the great majority it should be deferred until the end of the first or beginning of the second year. The mouth, nose and throat must be in healthy condition before any operation is attempted. Diseased or enlarged tonsils should be removed. Too deep an enucleation should, however, be avoided, since the adherence of the anterior and posterior pillars to one another and the cicatricial contraction following, draw the divided soft palate downward and outward, increasing the width of the cleft and making subsequent approximation more difficult. The presence of an enlarged postnasal tonsil, if not diseased, is sometimes an advantage, especially in older children, and in cases where the nasopharynx is abnormally wide and deep. It makes easier the closing off of the nasopharynx during deglutition. This closure is also essential in the proper enunciation of some of the speech sounds. Therefore, this tonsil should not be removed in all cases. In the presence of sinusitis the operation is almost certain to be a complete or partial failure.

Diseased teeth should be removed or filled. Congenital syphilis in all cases should be excluded before operation. Neglect of this caused two failures in my earlier cases before the blood tests were perfected. Operation should be deferred if coryza or bronchitis are present. The general condition of the child should be carefully looked into, and as high a standard of health secured as is possible before the operation. The question arises: Are congenitally deformed children poorer surgical risks than normal ones? I believe they are. It has occurred to me that there may be some subtle relationship between congenital deformity and the proper balance in the ductless gland system. The only fatality in my series showed status lymphaticus as the cause of death. In several others the shock was all out of proportion to the severity of the operation. In two of these subsequently radiographed there was a strong suspicion of an enlarged thymus.

Operation.—I shall here set down only practical points which have come to me during the fifteen years that I have been interested in this work. In the textbooks may be found the principles of the various operations. It is indeed unfortunate that in these textbooks we find so little of the intimate experience of the authors, and so small a space devoted to detail, on which assuredly the success or failure of the operation depends.

In children between one and two years, feeding should be given within four hours of the operation and should be begun just as soon afterward as food can be retained. A child's resistance ebbs very fast on starvation. In hare lip closures in infants, no feeding should be omitted. The anesthesia, in the latter operation, should be so light that vomiting ought not to occur during or after operation.

Position of Patient; Operator and Assistants.—By far the best position for the operator, both for a good view of the mouth and for his own comfort, is at the head of the patient. He sits on a moderately high stool with his feet resting on a high foot rest, and his knees projecting just above the edge of the head of the table.

The child's head rests between the operator's knees and is partly grasped by them. In this way the head can be moved laterally or dropped deeper between the knees if more extension is required. The two assistants stand on either side of the table and secure a good view of the field of operation.

The anesthetist sits at the side of the table and administers the anesthetic through a junker apparatus, to the end of which is attached a long bent sterilized glass tube.

The Anesthetic.—Chloroform, if not contraindicated, is preferred. Careful anesthesia is of great importance. In long operations a moderate degree of shock may occur, which is much increased by deep anesthesia. In fact, in bungling and slow operating with careless anesthesia, I have seen severe shock and even death occur. I have always believed that the anesthesia, in the majority of surgical operations, may be a more potent cause of death than the operation itself. The anesthesia, therefore, should be light, but not so light as to allow vomiting during the operation. Vomiting over the denuded area is, in my opinion, one of the most potent causes of failure to secure union.

Sponging.—In lieu of sponging I use suction through a small bent glass tube. The suction should not be strong enough to cause injury to the soft delicate tissues of the throat and palate. Strong suction may produce a very detrimental degree of traumatism. Sponges are used to make compression over bleeding points only, and to wipe off the denuded edges of the flaps before tying the stitches. I have seen the whole throat and soft palate covered with a pseudomembrane following rough sponging.

Traumatism.—In no operation is traumatism more productive of fracture than in that of cleft palate. In a dozen ways the friable tissues of the palate may be so injured as to make failure almost certain. During the process of separating the flaps from the bone the edges of the instrument must impinge upon the bone and not on the flaps. The flaps are lifted away, not torn away. The nearer the separation approaches to the gingival margin the more the blood supply to the flap is endangered. Therefore, it is important that the separation in the peripheral direction be carried only as far as is necessary to secure coaptation. It is better to leave the flaps with some attachment to the bone and use longer lateral incisions, than to lift them away as far as the teeth, with the hope that the lateral incision may be avoided. Before the eruption of the teeth the above does not hold true, since then there is a continuous and good blood supply over the gingival ridge. Therefore, in children under one year, the flap separation may be carried with safety to the level of the apex of this ridge. This is an argument in favor of operating before the eruption of the teeth takes place. Artery clamps should never be used to control hemorrhage except in the rare instance in which the posterior palatine artery cannot be controlled by sponge pressure. Wherever a clamp is used on this tissue there will be a slough later. The flaps should be handled with forceps as little as possible. When the stitches are being inserted a plain forcep may be gently used to hold the edges, but all undue pressure should be avoided. In denuding the edges of the flaps a very sharp thin-bladed knife is used. I prefer an eye knife. The edge is grasped at the junction of the hard and soft palate. The knife then transfixes the tissues just external to the forceps and is slanted from without inward in order to increase the denuded surface. A sawing motion is used, endeavoring to remove the strip in one long, unbroken piece. Enough should be taken to secure a good surface but no more.

Coaptation of Flaps.—Many and strange are the methods of inserting the stitches. I would condemn all needles set on handles (socalled aneurism needles). They all have a flat surface and a cutting edge, and are large and strong enough for a laparotomy. They leave a long, ragged hole. The undue manipulation necessary in their use injures the tissues and wastes time. I prefer very small curved and straight needles with trochar points held in an eye needle holder. Some may argue that such a needle holder is too short. Any unnecessary length makes the accurate placing of the stitches that much more difficult. The needle is inserted near the edge and plunged outward so as to get a deep grasp on the tissues. The reverse movement takes place as the needle is brought back through the opposite flap. Stitches so inserted when tied tend to evert the edges of the flaps and bring a greater raw surface in contact. They should be placed about five to the inch. A very important point is not to tie them too tight, as allowance must be made for reactionary edema. Very fine silkworm gut (ophthalmic gut) and coarse horse hair are perhaps the best suture materials, though I have used Pagenstecher's thread and Lillienthal's silver wire with equally good results. Where time is a consideration the continuous suture may be used, with or without locking each stitch. When this is employed I use one thread for the hard and one for the soft palate. Before each stitch is tied the raw edges should be wiped with a small sponge wet in saline to remove all blood clot.

Methods of Relieving Tension.—This is perhaps the most difficult problem that confronts us, as is evidenced by the variety of opinions and methods advanced. To relieve tension without unduly limiting the blood supply must be constantly kept in mind. In some of my earlier cases I violated this principle, with the result of seeing some perfect looking palates after operation, fall to pieces in a few days. I believe now that these failures were largely due to placing too much confidence in the lateral tension relieving plates advocated by some surgeons. It is my opinion that the principle of these plates, though perhaps correct in theory, is ineffective and even injurious when applied to this particular operation. We must remember that we are dealing with a tissue not much stronger than thick wet paper. To secure a holding grasp on this tissue with as thin an edge as even the large silver wire used, is impossible. As the plates are applied the direction of the lines of force are not upon the surface of the palate, as supposed, but almost entirely on the stitch holes. If the plate is tilted so as to bring the force more against its surface, then its distal edge impinges against the flap, cuts off the blood supply and causes sloughing. Moreover, its under surface furnishes a fine retainer for septic material, which coupled with the inevitable traumatism already done, opens still wider the avenue to failure.

The advantage secured by preserving the posterior palatine arteries is so great that every effort should be exerted toward this end.

It is, however, frequently impossible to sufficiently lower the flaps without carrying the separation beyond the emergence of these arteries from their foramina. Unfortunately it is just at these points of emergence that the lateral incisions do most good in taking the strain off the weakest point in the line of union (just anterior to the soft palate). Here the flap is so thin that an edge-to-edge approximation is not sufficient to secure union. The edges must be everted so that the upper raw surfaces lie together. To secure this without tension the lateral incision must be carried around the curving edge of the posterior end of the alveolus. I have found that if this incision is made a little internal to this curving edge that some branches of the artery are left uncut and a better blood supply is probable, or the incision may be made in front and behind the location of the artery. It is well to insert as many stitches as possible before making the lateral incisions. The approximation is done in front and then behind the maximum tension. Then the incisions are made and extended as each stitch is drawn up. Excessive side cutting is thus avoided. It has been observed that the lateral incisions tend to come together and close long before the central line of union is secure. To prevent this, tape has been passed from one incision across to the other and secured, with the object of holding the tissues to the center and preventing lateral closure. The tape is objectionable because it cannot be kept clean. I first tried silver wire, but it cut into the flaps. Then I devised flat-faced small retractors made of silver. (See diagram.) These can be made in any width desired. The arms are about equal in length, the object being to secure a good grasp on the inner edge of the lateral incision. The arm on the palate or buccal side has an eye in its end to which a strong linen thread is secured. The threads of the two retractors are tied and drawn together sufficiently to take all tension off the central line. The retractor can be made for each case by the surgeon from virgin silver plate rigid enough to maintain its shape when bent. It should be of sufficient width to insure it against cutting into the edge of the lateral incision. For cases where lateral incisions are not needed, but where some tension is feared on account of postoperative reaction, I have found very serviceable the single or double hooks shown in the diagram. These have flat faces, sharp points and well curved hook ends, so that they can be plunged through the flap at any desired point and will not pull out of place. The buccal arm of the hook has a small eye for the attachment of a linen thread. This is tied to its fellow of the opposite side sufficiently tight to relieve central tension. I claim for these retractors and hooks facility of application and cleanliness. The flat surface impinging against the soft palatine tissues does not cut its way out as does the silver wire. The amount of tension can be better judged when tying the linen thread than when twisting the stiff silver wire formerly used for the same purpose. Tongue pressure as a factor in producing strain has, so far as I am aware, been overlooked. That it is a potent cause of failure needs no proof when we consider the amount of upward force exerted by the tongue in each act of swallowing, and that this act takes place every few minutes, more or less unconsciously, and quite independent of the taking of food.

For several years I have been using a device for the relief of this strain, and now feel justified, on account of the good service it has rendered me, in presenting it for trial by others. A plaster cast of the palate is taken, and on this cast is made an obturator which fits accurately along the inner margin of the gingival ridge in infants, and along the bases of the teeth in older children. The obturator is made of platinoid wire, heavy at the rim and light inside. The wires are cross barred and soldered at the points of crossing. (See diagram.) After the completion of the operation the obturator is sewed to the gums in infants and tied to the teeth in older children. Three points of attachment are sufficient—two well back on the sides, and one in front. This is left in until the stitches are removed. It in no way obscures inspection of the wound or interferes with cleanliness. I use it in all cases where the cleft extends beyond the soft palate. It should be made flat or curved slightly upward, and should not project far enough back to impinge against the downward curve of the soft palate.

The After-Treatment.—If in dealing with this I were limited to one statement, I would say: secure rest of the operative field as far as possible.

Of course, absolute rest in this situation is impossible, but the principle should be kept in mind during the whole after-treatment. It is an excellent plan to place the child in a hospital several days prior to operation, under a nurse trained in the care of children, in order that proper control be established. Many children are spoiled in their homes by too much indulgence. We have all observed how angelic those unruly ones become after even a few days under hospital régime. In no operation is control more important, if we wish to secure, after operation, the maximum of local surgical rest. Talking is prohibited in older children. Every effort should be made to prevent crying in younger ones. In these the hands should not be tied, as is sometimes foolishly done. But movements in the direction of the mouth should be limited. The mother should stay with the younger children, and as a rule must receive a course of training as well as the child prior to the operation. If a very young child is insufficiently fed it will cry constantly; therefore, there should be no starvation with the object of preventing swallowing and the contaminating of the mouth with food. In some children carefully done lavage (inserting the catheter through the nose after a spray of a weak solution of cocain) succeeds very well. When much resistance is met with on the above method, mouth feeding by spoon is best. Milk, oatmeal-jelly, white of egg, milk sugar are the best foods. After feeding, a drink of sterilized water should always be given. Sleep must be secured by opiates or sedatives, if needed. In fact, the more the child sleeps between feedings the better in the forty-eight hours following the operation.

In conclusion, I would say that this operation should be in the hands of men experienced in plastic surgery, men trained in work requiring fine manipulations. Therefore, I turn with hope for betterment in this difficult and discouraging field to the rhinologist and laryngologist of the future.

AGE AT OPERATION.

Under three years	20
Three to six years	18
Six to ten	9
Over ten years	17
Total	64

TABLE OF RESULTS.

Complete failures	7
Partial failures	6
Closed by second operation	12
Closed by third operation	1
Closed spontaneously after partial failure	2
Deaths	1
Closed by first operation	37
Ultimate complete closures	50
Speech normal	17
Speech improved	17
Speech not improved	30
Total	64

In the fifty complete ultimate closures, speech was normal or improved in thirty-four, unimproved in sixteen. In two not old enough to be tested, the prospects are good.

No.	Age	Extent of Deformity.	Ultimate Result of Operation.	Remarks.
1	2½	Soft palate.	Movable soft palate.	Speech good.
2	10	Hard and soft palate.	Complete closure; some rigidity of palate.	Speech improved (no training).
3	6	Hard and soft palate.	Hole remains at junction of hard and soft palate.	Refused further operation; speech unimproved.
4	5	Soft and one-half hard palate.	Absolute failure, due to low arch.	Child defective.
5	3	Soft and two-thirds hard palate.	Completely closed.	Speech good.
6	2½	Complete hard and soft palate with hare lip.	Completely closed by second operation.	Speech fair, though carefully trained.
7	3	Soft and notch in hard palate; very wide cleft; flat arch.	Complete closure.	Palate tense; speech fair; K sounds defective.
8	4	Complete hard and soft.	Complete closure.	Deafmute; good flexible palate.
9	10	Complete hard and soft.	Complete closure; soft palate short.	Speech bad; extreme type of malocclusion.
10	1½	Complete hard and soft. Double hare lip.	Complete closure.	Speech good; incisors badly turned backwards.
11	9	Hole left by operation elsewhere in center of palate; soft palate fibrous.	Closed hole and palate; no uvula.	Speech but slightly improved.

No.	Age	Extent of Deformity.	Ultimate Result of Operation.	Remarks.
12	1¼	Complete hard and soft.	Complete closure.	Speech perfect.
13	7	Soft and one-half hard; low arch; wide cleft.	Hole at junction of hard palate; hole closed spontaneously in six months.	Speech but slightly improved on account of tension; no palate, due to fibrous contraction.
14	9	Soft palate only.	Complete closure.	Speech fair.
15	19	Soft and hard palate.	Complete closure after second operation	Speech improved. I gave her personal teaching in clinic for one year.
16	12	Soft and one-half hard palate.	Complete closure.	Speech not improved; mentally defective.
17	2½	Soft and part of hard; rest of palate very thin; no bone.	Complete closure.	Speech good.
18	9	Complete cleft of hard and soft palate.	Small hole left.	Refused further operation; wears obturator; speech unimproved.
19	12	Soft and three-quarters hard palate.	Complete closure after second operation	Speech improved; K and S sounds defective; intelligent; still improving.
20	2	Complete hard and soft, with single hare lip.	Complete closure excepting for very small hole near incisors.	Speech good; some trouble with K sounds.
21	5½	Complete hard and soft palate.	Complete closure with flexible soft palate.	Speech much improved; K and G sounds defective.
22	13	Complete hard and soft.	Lateral hole.	Obturator used; speech slightly improved.

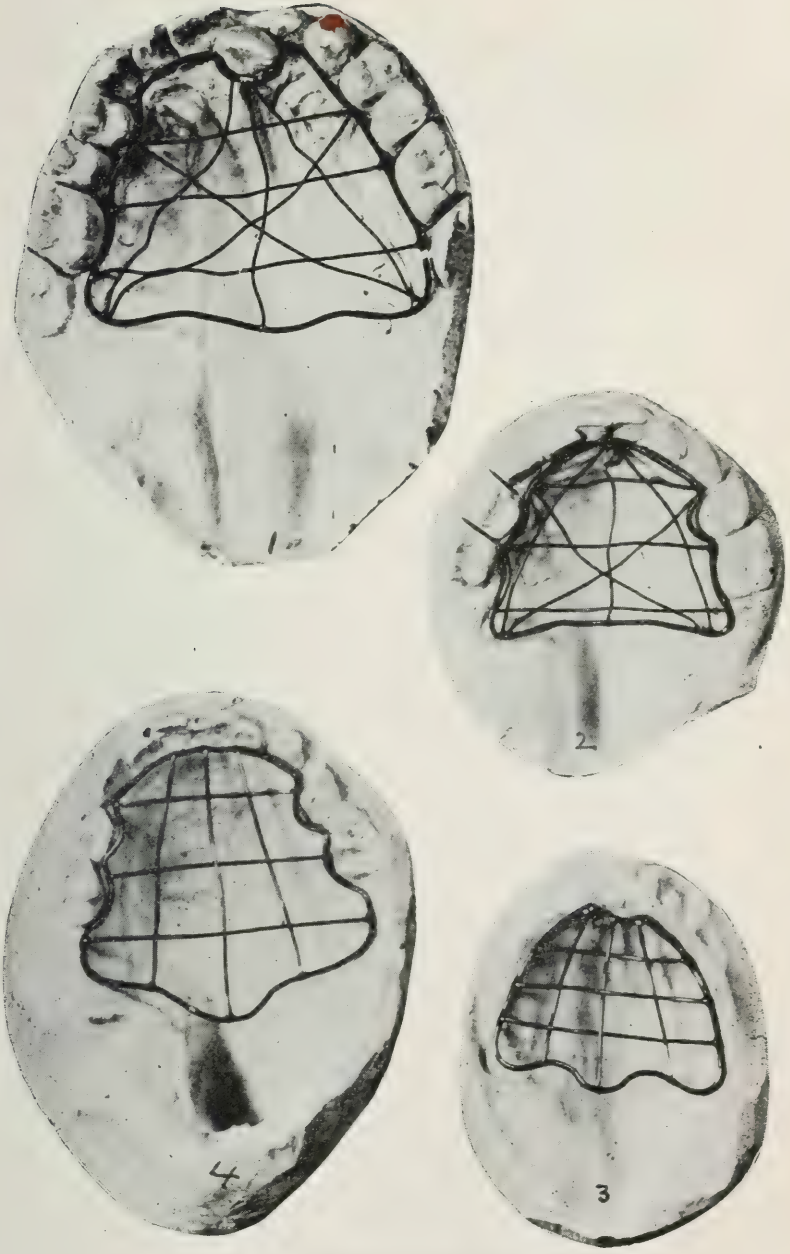
No.	Age	Extent of Deformity.	Ultimate Result of Operation.	Remarks.
23	9	Complete hard and soft.	Complete failure after two operations.	Child very delicate. Tubercular glands in neck. Father had syphilis. Wassermann negative in child.
24	3	Complete hard and soft palate.	Hole in soft palate closed by second operation.	Speech improved; no training.
25	12	Soft palate only.	Complete closure.	Speech not improved.
26	19	Soft and one-half hard palate.	Soft palate closed.	Chronic sinusitis and discharge precludes further operation; obturator; speech not improved.
27	4	Complete hard and soft palate.	Complete failure; Lane operation done one year later; complete closure.	Speech not improved; child now six and a half years old.
28	14	Wide cleft of soft and one-quarter of hard palate; low arch.	Complete failure.	Cleft was wide. Lane operation should have been done in this case.
29	6 mos.	Complete cleft of hard and soft palate and hare lip.	Complete closure of palate; lip was closed at sixth week.	Speech normal for age.
30	1¼	Soft and one-half hard palate.	Complete closure after second operation; good flexible soft palate.	Speech not quite normal for age.
31	6	Soft palate and part of hard.	Small hole at junction of soft and hard palate closed by second operation.	Speech improved; no training.
32	1	Complete hard and soft palate with double hare lip.	Complete closure.	Too young to list speech; palate flexible; prospects for speech good.

No.	Age	Extent of Deformity.	Ultimate Result of Operation.	Remarks.
33	6	Soft palate only.	Complete closure.	Speech not improved; reason not evident.
34	1	Complete soft and hard palate; low arch.	Three holes in palate.	Lane operation done; practically a complete and irreparable failure.
35	5	Soft palate.	Broke down completely on second day; child ran septic temperature for two weeks.	Refused further operation.
36	1½	Soft palate only. Child very fat; large hips and thighs; no hair; blond; florid. Mother forty-two years old; first child	Child died suddenly six hours after operation (lasting one-half hour, chloroform anesthesia).	Enormous thymus found; evidently thymus death.
37	1½	Complete hard and soft palate.	Soft palate broke down after first operation, also anterior part of hard palate Soft palate united after second operation. Small hole just behind incisor. Closed spontaneously in four months.	Speech satisfactory (by letter).
38	2½	Complete hard and soft palate; two previous operations; great thickening of tissues.	Two operations done elsewhere; first at ten months, second at eighteen months; both failures. Lane operation completely closed palate. Soft palate tense and fibrous.	Speech so far unimproved (four years old). Prospects for good speech poor.
39	17	Oval hole junction of hard and soft palate. Operation elsewhere at three years.	Hole very small after operation; closed two months later.	Speech improved.
40	13	Complete hard and soft palate.	Soft palate only united.	Speech not improved; further operation refused.

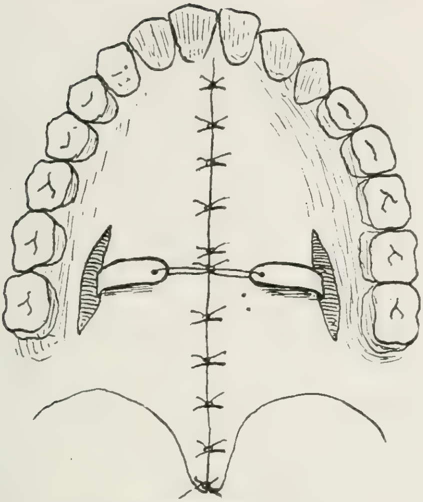
No.	Age	Extent of Deformity.	Ultimate Result of Operation.	Remarks.
41	11	Soft and half of hard palate.	Complete closure; good soft palate.	Speech slightly improved after considerable training.
42	2½	Soft palate; previous operation by another surgeon, in first year.	Hole remains at junction of hard palate; size large.	Speech fair.
43	9	Soft palate.	Complete closure; good flexible palate.	Speech improved; training poor.
44	4	Soft palate.	Complete closure; palate tense.	Speech slightly improved.
45	5	Soft and two-thirds hard palate.	Good soft palate.	Speech much improved.
46	15	Operation done elsewhere, leaving large central hole. Lane operation done.	Complete closure; soft and hard palate fibrous; no mobility.	Speech not improved.
47	11	Wide cleft soft palate; low arch.	Lane operation; good looking palate.	Speech unimproved after careful training.
48	1	Complete hard and soft palate; hare lip single.	Complete closure.	Speech normal for child of his age (by letter).
49	3	Soft palate, one-half hard; very flat arch.	Lane operation; palate closed; posterior edge of soft palate notched on one side; tissues tense.	Speech bad; child now four and a half years.
50	20	Complete soft and hard palate; high arch.	Closed after second operation.	Unimproved after one and a half years' training.

No.	Age	Extent of Deformity.	Ultimate Result of Operation.	Remarks.
51	14	Hard and two-thirds soft palate.	Complete closure.	Speech not improved; child mentally defective.
52	6	Complete hard and soft palate; lip closed at second year elsewhere.	Operation by Langenbeck method; complete failure. One year later Lane operation closed cleft and gave a cicatricial soft palate.	Speech not improved one year later.
53	4	Soft palate; slight notch in hard palate.	Complete failure, due to syphilis not recognized before operation.	Refused further treatment.
54	2½	Complete hard and soft palate.	First operation only soft palate closed Second operation left hole behind incisors. Closed by third operation.	Severe type of malocclusion. Speech not much improved after one year home (poor training).
55	2½	Soft and one-quarter hard palate.	Small hole at junction of hard palate closed by second operation.	Speech improving; good training.
56	4	Soft and hard palate; previous operation at two years of age; failure by another surgeon.	Lane operation done; complete and hopeless failure.	No further operation possible.
57	1½	Soft palate.	Complete closure; movable palate.	Too young to judge if speech prospects good.
58	18	Hole at junction of hard and soft palate; bifid uvula.	Hole reduced one-third former size. Second operation, flap turning, closed hole	Father states that speech is improved (by letter).

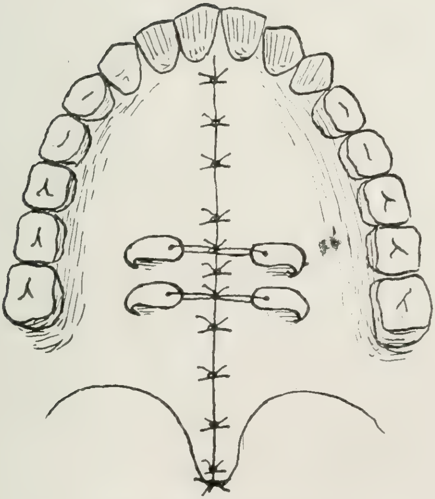
No.	Age	Extent of Deformity.	Ultimate Result of Operation.	Remarks.
59	3½	Soft and one-quarter hard palate.	Complete closure; good soft palate.	Speech seems normal for age.
60	12	Hard palate; soft palate closed elsewhere four years previous.	Lane operation; good closure; soft and hard palate fibrous and tense.	Speech not improved.
61	5	Soft and hard palate.	Complete closure, except in uvula; still bifid.	Speech improving.
62	6½	Soft and hard palate, almost to incisors; V-shaped cleft; low arch.	Complete closure; tissues very thin at junction of hard and soft palate.	There is some liability of this tissue breaking down later; speech much improved.
63	6	Soft and one-third of hard palate.	Complete closure; tense palate.	Speech slightly improved.
64	4½	Soft palate.	Complete closure; soft palate somewhat tense.	Speech not improved to date.



Plaster casts showing obturators in place.



Retention retractors.



Retention single hooks.

XIII.

DISEASES OF THE SALIVARY DUCTS.*

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The ducts of the salivary glands present many points of interest, whether affected by disease or injury, whether acting as highways of infection to the glands or as channels of escape for diseased products originating in the glands themselves; or it may be that the ducts themselves are the seat of the diseased condition, or they may be conjointly affected with the glands. In all of these conditions we have to do with the important tracts that play so marked a rôle in disordered conditions of the salivary system, and where patency is so necessary for the proper discharge of the secretions forming the saliva. It is indeed strange, not that the glands and ducts become affected by the entrance of disease bearing microorganisms, but that there is so seldom infection, and that the variety of infection is so limited, and that really we have but a few diseases either of the ducts or of the glands themselves.

When we call to mind what numerous pathogenic bodies are present in the mouth at all times, and how receptive the buccal cavity is for all sorts and conditions of diseased emanations from the outside world, it is, I repeat, strange indeed that we have such a limited number of diseased conditions of the ducts and glands of the salivary system. It will be best perhaps to take up in detail the troubles arising in connection with Stenson's duct and the parotid gland, and later conclude with the diseased conditions that arise in the ducts of the sublingual and submaxillary glands. Stenson's duct is the name given to the excretory duct of the parotid gland which, beginning as small branches in the gland itself that unite in one common trunk, runs from the anterior border of the gland, passing over the masseter muscle, and piercing the buccinator, opens into the buccal cavity on the inner aspect of the cheek opposite the second molar. The walls are quite thick and consist of an outer fibrous coat with contractile fibers, with an inner coat lined with columnar epithelium. Its course[1] is indicated by a line drawn from the lobule of the ear to a point midway between the ala nasi and the margin of the upper lip, and lies above the facial nerve.

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*Candidate's thesis, presented before the American Laryngological Association, 1914.

The following is fairly good classification of the affections of the duct, which are either primary or secondary: The primary diseases of Stenson's duct are (a) an inflammation, acute or chronic; (b) formation of calculi in the duct; (c) injuries to the duct. The secondary affections are: (a) Occlusions of the duct following acute inflammation; (b) following excessive salivation; (c) impaction of calculi; (d) stricture due to healing of wounds; (e) ulceration of the duct or abscess in the duct due to impacted calculi; (f) stenosis and ulceration due to impaction of foreign bodies; (g) cystic dilatation due to[2] simple inflammation of cicatricial obstruction and suppuration; (h) fistulæ. An acute inflammation of the duct which is strictly primary is due to exposure to cold or extension by continuity of an existing inflammatory condition of the mouth.

The following is a typical case: Mrs. S. G. awakened on the 20th of June, 1891, after exposure to cold and wet the day before on an ocean steamer; she found that she could not open her mouth wide, and that she had a swelling in front of the right ear, and in addition presented the symptoms of an acute cold; her eyelids were swollen and her throat was sore. She came to my office September 25th, and said that even at that time her head and throat were all filled up. She also complained of a feeling of fullness in her right ear, and stated that her mouth was apt to be dry. Examination showed that her ear was normal. There was a large hard swelling of her right parotid, with no special tenderness. There was also a hard cord-like feeling along the course of Stenson's duct. The duct would admit only a small probe and for only a short distance at first, but repeated trials finally were successful, so that the small probe could be introduced the whole length of the duct, and gradually probes of increasing size were passed until the duct was thoroughly and permanently dilated, with the result that the flow of parotid saliva was normally established and the gland reduced to its proper size. A calculus may form either in the duct itself or in the parotid gland, or there may be more than one present. This stone is formed of phosphate and carbonate of lime, and although this condition is more common in the ducts of the submaxillary and sublingual ducts, it is not at all uncommon in the ducts of the parotid gland. The color is a dirty yellowish white, and its presence may be felt by palpation or by exploring with a probe passed through the duct to the point of obstruction, or a hypodermic needle may be plunged through the duct wall and the nature of the swelling determined by its feeling of hardness.

These stones in the duct itself form only where the lining[3] of the duct has been roughened or thickened, or a partial or complete stenosis has resulted with an accompanying decomposition of the parotid saliva. Or, as has been stated,[4] a plug of mucus containing some bacteria is retained within the duct and forms a nucleus for the successive deposits of inorganic salts, principally phosphate and carbonate of lime.[5] Sometimes suppuration may occur around these calculi, with the formation of an abscess which may discharge into the mouth or externally forming a fistula. When the stone is in the duct itself the diagnosis is ordinarily simple, but if in the substance of the gland it may be extremely difficult, and in this case a radiogram may be of great assistance. When the calculus is in the duct itself it is easily reached through the mouth, the duct incised, and the stone removed by forceps or manipulation. When, however, the stone is in the substance of the parotid gland the calculus itself should be excised and the wound closed to prevent the formation of a fistula, care being always exercised to avoid the facial nerve, where injury would bring about that distressing and disfiguring condition, facial paralysis. Injuries to Stenson's duct may be due to the traumatism of operation or to accidental injuries resulting in laceration or cutting or contusing of the duct. There may be a complete severance of the duct with the whole substance of the cheek wall, or the wound may be from the outside of the face down to and including the duct, but not the buccal surface. Or the injuries may be from within the mouth and affecting the duct, but not the skin; or there may be a contusion of the parts with laceration of the duct, without either an external or internal wound, in which case there will be a swelling of the cheek due to the infiltration of saliva into the cellular tissue of the cheek.

One of the earliest mentions of a salivary fistula is by Ambrose Paré, in the sixteenth century, as follows: "Cértait un soldat qui avait reçu un coup d'éprée au travers de la mandible supérieure, la plaie guérit, il ne restait qú un bien petit trou pres de la conjonction de la mandible inférieure a la mandible supérieure non plus grand qú a mettier la teste d'une épingle duquel luy sortait en parlant ou maschant, grand quantité d'eau fort claire et que j'ai souventes fois veue."

There may be a single fistula or there may be multiple fistulæ, the latter when the trouble is in the parotid gland itself, and the discharge of fluid is from the gland itself. I have recently had a striking example of this where an operation for removal of the cervical glands had been performed months before, and during all the time from the operation to the patient's visit to my office the wound had never entirely healed, and there was a continued dribbling of thin discharge which excoriated the neck. The parotid was at the same time enlarged, and it was only after several weeks' treatment that the multiple fistulæ healed and the gland returned to its normal size, this after numerous cauterizings of the fistulæ and a thorough dilatation of Stenson's duct. The treatment of fistula of Stenson's duct differs according to the character and seat of the lesion. When the wound of the duct is from within the cheek, although a fistula ensues, the condition is of practically no importance, the parotid saliva simply escaping through the false passage into the mouth, and the anterior portion of the duct becomes useless and discarded. Should the whole thickness of the cheek be cut through, the outer or cutaneous surface should be carefully sutured and an attempt made to get healing so that the saliva may escape through the internal fistula into the mouth.

Of the duct fistulæ there are two varieties: First, where the fistula communicates with the duct as it lies over the masseter muscle (the masseteric[12]); second, when it lies in front of the anterior border of the masseter muscle (the buccal). When the fistula involves the anterior portion of the duct, the method of Langenbeck and Riberi,[13] which are alike, can be utilized. The part of the duct behind the fistula is exposed and dissected out, and passed into the mouth through a perforation made in the cheek. When a large portion of the duct is destroyed, or there is a lot of cicatricial tissue, Dejardin and Guilikers[14] perform the operation in this manner. The outer portion of the canal, together with the masseteric prolongation of the parotid gland, is exposed, then the opposed margins of the gland and masseter muscle are separated; after this the inner surface of the masseter is detached from the outer surface of the ascending ramus of the jaw, and the exposed and dissected portion of the gland is thrust between the masseter and the bone through an orifice made in the buccal mucous membrane, to the margins of which it is fixed by a suture. Sometimes a fistula of the duct may be treated by inserting a silver suture inside the cheek, the free ends being about one-eighth of an inch apart, the suture closed and tightened until the included portion of the cheek, sloughing out, forms an artificial opening for escape of saliva into the mouth, at the same time closing the external opening by application of caustics or use of the galvanocautery or by freshening the edges of the fistula and closing with sutures. One of the oldest methods of curing a fistula of Stenson's duct is passing a seton through the whole thickness of the duct and the two ends tied at the angle of the mouth, this moved back and forth frequently until a flow of saliva is established toward the mouth; then the seton is removed and the external wound closed. Whatever method is used, patience and perseverance must be exercised, and every means tried to insure,if possible, a cure of this distressing condition, which may be so bad as to make life miserable for the sufferer. Occlusion of the parotid duct may follow as the result of adhesions subsequent to acute inflammation[6] or violent salivation—this, of course, occurs rarely in these times, as salivation is accidental and not premeditated as in olden days. This condition may also occur after scarlet fever or diphtheria or gangrene of the cheek. The healing of wounds of the cheek may produce a stricture of the duct, or the duct may be blocked up by the impaction of a calculus, or a stenosis may result from the ulceration or abscess due to impacted calculus, or it may be due to the impaction of foreign bodies other than a stone, such as hair[7] in the duct, fish bone,[8] bristle from tooth brush, small bearded tail of a chestnut, etc. Cystic dilatation of the duct may be due to simple inflammation[9] or cicatricial obstruction and suppuration, or from the presence of a calculus, causing ulceration and thickening of the walls, or it may occur as an occupational disease, in glass blowers or performers on wind instruments. These tumors are gaseous,[10] the duct becoming infected with the air may be mixed with the saliva and pus. Further, if plugs of mucus[11] or small calculi obstruct the exit of the duct, they may cause an accumulation of fluid which, if it persists, may result in the dilatation of all the ducts emptying into the obstructed one and convert them into an epithelial lined cavity.[15] Running along the floor of the mouth between the teeth and the tongue, parallel to the alveolus, is the sublingual ridge, formed by the sublingual gland. This gland lies on the mylohyoid muscle, with the lower jaw in front. On each side of the frenum on the sublingual ridge is a papilla into which the duct of the submaxillary gland (Wharton's duct) opens. Opening into the same Wharton's duct, or by a separate duct into the same papilla, is the duct of the sublingual gland, called the duct of Rivinus or Bartholini. The superficial portion of the sublingual gland opens on the sublingual ridge to the outer side of the papilla by a number of small ducts, called the ducts of Walther.

A calculus in the submaxillary duct or gland[16] occurs more frequently than does one of the parotid gland or Stenson's duct, and this has been attributed to the presence of mucin in the secretion of the submaxillary gland. When the calculi form in the gland itself they are apt to be very persistent, and the number of stones which may be removed is at times very large, as in one of my cases—a young woman went through a period of about a year, during which many calculi, varying in size, were shed, after the parts became softened, so that incision was demanded, and through the incision a calculus could be removed; in fact, this happened so frequently for months that she semed to be a veritable quarry. After the lapse of time she had no further trouble, nor has she had for about three years.

More frequently the stone forms in the sublingual duct itself, and, as described by Howard,[17] presents four types of clinical features: First, a class of cases in which the patient complains of a hard swelling in the floor of the mouth, but without any subjective symptoms. Then there is a set of cases where the submaxillary is acutely swollen and painful, and the patient seeks relief shortly after the onset of the symptoms, and in these cases there is sometimes a spontaneous evacuation of the stone. Then, again, occur those cases in which there are recurrent attacks of swelling of the gland, usually during eating, at which time the gland becomes tender and painful, although the patient may have freedom from uncomfortable symptoms for weeks; and lastly, there is the type of cases where suppuration occurs around the stone and an abscess forms which may discharge into the mouth or even externally, forming a fistula.

Frequently a stone imbedded in the submaxillary duct is a source of much irritation; the parts get thickened and tender, and there may be a discharge of pus, appearing at the papilla of Wharton's duct. The breath may be foul, and there may be a marked constitutional effect from the absorption of pus and a fear on the patient's part that he is suffering from a case of malignancy. I have recently had such a case, that had been treated for months. The man had lost flesh, and at the time of his visit to my office he was nervous and anxious about his condition, and fully expected that the tender swelling in the floor of his mouth was a cancer. He had reached a point where it was almost impossible for him to attend to his daily work. Simple incision and removal were all that was necessary; the wound healed quickly and he was back at his work in less than a week, a well man. One woman came to me much exercised over a sore that she had in the floor of her mouth, fully thinking that she had a cancer, and had kept away from doctors for fear of being told that it was malignant. There was a thickening under the tongue, a foul sore covered with a grayish exudation. In this case she had undoubtedly had a calculus in the submaxillary duct which had caused an inflammation of the duct, an abscess had formed, broken, and the stone had come out without her knowledge, and the sore had became infected from her mouth. Excision of this mass resulted in quick healing and a complete cure.

When the stone is situated in the submaxillary gland it may be well to remove the gland, but if in the parotid gland it is the stone that should be excised and not the gland, on account of the facial nerve situated in it. In general it may be stated that salivary calculi are[18] formed by deposits of earthy salts (chiefly calcium phosphate), from the saliva in the excretory ducts leading from the gland or in the gland itself.

These stones may have nuclei, as, for instance, in Tilnig's[19] case, where a calculus three centimeters in length was taken from Wharton's duct, which had in its center a hair, or as in Dr. Selenkow's case, where the center of the concretion was masses of leptothrix. Foreign bodies may get into the duct, as in the case of a boy, sixteen years of age, who thought he had got a piece of oats stuck in his tongue, in July, 1910. The submaxillary gland was enlarged and there was a hard swelling along the course of the submaxillary duct, and in March, 1911, a piece of straw came out spontaneously, the symptom entirely disappearing. Another case was one where there was a swelling of the submaxillary gland, which was increased on taking acids. Removal of a stone from Wharton's duct relieved the symptoms.

Of the various affections of the salivary apparatus, a not uncommon one is the disease known as ranula. This, according to one definition, is a "fluctuating semitransparent tumor under the tongue, resulting from accumulated saliva and mucus in the ducts of the sublingual gland, or from the independent development of a cyst in the sublingual region." This somewhat indefinite statement as to the pathology of this condition is in keeping with the two schools of opinion as to the seat of the affection.

Davis[20] says that a ranula is a name given to a cyst occurring in connection with the salivary glands, the sublingual or submaxillary, and when the duct of either is obstructed, as by a calculus, it will form a cyst which would bulge into the mouth beneath the tongue and be called a ranula. The sublingual gland is usually the starting point of these cysts, and will be seen that as they enlarge they push the ranine artery, with the tongue backward, and are only covered with mucous membrane.

Butlin[21] states that a ranula is a dilatation of acini or ducts of mucous glands beneath the tongue and not a dilatation or Wharton's duct, and worked out by von Recklinghausen and Sommenberg in this manner. They claim that the gland which is diseased is the Blandin-Nuhn gland, a small mucous gland situated on the under surface of the tongue, a little to one side of the middle line, and the cyst is formed by the dilatation of one or more of the acini of this gland.

That any smooth tumor under the tongue anteriorly is apt to be loosely diagnosed a ranula is well illustrated by a description of ranula by Dorsey,[22] 1823: "This consists of a tumor under the tongue containing a glairy fluid resembling the white of an egg. It is supposed to proceed from an obstruction in the salivary duct. The tumor sometimes contains, instead of the viscid fluid that has been mentioned, a purulent matter, and sometimes a calcareous concretion."

In this description he does not separate a true ranula, which is a dilatation of one or more of the acini of the Blandin-Nuhn gland, and a dilatation of Wharton's duct or of Rivinus or Bartholini duct. If the swelling is a true ranula, passing a probe into Wharton's duct will go, not through the swelling, but beneath it, and the swelling will not be diminished in size. Really the only conditions that might be confounded with a ranula are either nevus or a dermoid cyst. A nevus is not fluctuating, and the blood is easily pressed out of the swelling, and the swelling is opaque. The dermoid cyst is doughy in feeling, and there is a lack of translucency, and forms a hard swelling behind the jaw bone. Usually with a ranula there is absence of discomfort unless the swelling is of considerable size, while with a dermoid cyst there is discomfort in speaking or eating, with a constant feeling of fullness in the mouth; it is yellowish in color, there is a swelling behind the chin rather than under the tongue, and has the usual contents of a dermoid cyst, cholesterin, epithelial cells, fatty débris, rarely hair and with extreme rarity bone and teeth.

In the study of diseases and pathologic conditions of the salivary ducts one can but be impressed with the extreme rarity of malignant affections of these structures, and with the readiness with which most of the untoward conditions can be remedied, although each case must be dealt with according to its requirements, and not according to any general rule. Yet many of these cases must be cured only after a prolonged course of treatment before relief can be obtained, and I am sure no class of cases will give more satisfaction, both to surgeon and patient, than these same salivary affections, and especially in the cure of external salivary fistulæ.

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XIV.

NOTE CONCERNING AN ARTIFICIAL EAR.

By Samuel Horton Brown, M. D.,

Philadelphia.

Several years ago, while engaged in the examination of an applicant for life insurance, in the course of the routine questions regarding the presence of deformities, etc., I asked an apparently normal man in a more or less joking manner if he had any glass eyes, wooden legs, or anything of the sort, and he quickly answered me that he had not, but that he was wearing something entirely artificial and that he was taking no pains to conceal it, but rather was anxious that it would be seen. This curious answer to my questions was rather disconcerting, and an endeavor was made to determine just what this condition of affairs was. The place in which the examination was made was rather dark, and it remained for the man to show me the condition, which he did by removing one of his ears. This was a most remarkable state of affairs, and a close inspection was then made of the man's ear. He had absolutely no external ear except the canal; the auricle was entirely gone. When a boy he had been dragged on the side of his face and head in the snow for a long period after having fallen from a sled or sleigh, with the result that this particular ear that was injured was torn off and the remnant of it sloughed off. When he was old enough to wear an artificial ear with safety, he had a series of them made of papier mache and colored by an artist to match the good ear of the other side. He then proceeded to show me his collection of ears, Sunday ones as well as weekday ears. He held them in place by the simple expedient of pasting them on with mucilage. From a cosmetic standpoint they left little to be desired, and I have no doubt served to gather the sound waves as well as the natural ear. What effect such a condition would have on mortality statistics is a question, for it is a certainty that any condition not encountered by the actuaries in their figuring is assumed not to exist. Therefore, this note is made that it may be of record that a healthy adult man has been observed with an artificial external ear without any disease of the other parts of the ear.

XV.

HARMLESS POSTOPERATIVE TEMPERATURE.

By Geo. F. Cott, M. D.,

Buffalo.

The danger of chronic suppuration of the middle ear is evident to all. We often have typical lesions, while at other times they are altogether out of proportion to the symptoms. A brain abscess may be latent for an indefinite time without any symptoms whatever, but usually there is some indication of hidden trouble. Occasionally multiple abscesses occur when but one is suspected. Pachymeningitis is frequently found, without manifesting any symptoms, and even epidural abscess is occasionally discovered during operation. These cases may be exceptional, but they occur with sufficient frequency to justify careful consideration of the subject.

In pachymeningitis with pus we expect pressure pain with perhaps intermittent discharge; the pains may be severe, mild or absent altogether. In leptomeningitis we have irregular temperature, stiffness of the neck muscles, Babinsky, tache cerebral, Kernig's sign and other nervous signs, which may be augmented by examination of the spinal fluid. Brain abscess usually gives us a slow pulse, dull pain, low temperature, slow mentality, sleepiness or somnolence. If the abscess is located in the cerebellum, in addition there is usually nystagmus towards the side of the disease; dizziness and occasional vomiting also occur. In phlebitis, especially of the lateral sinus, which is most affected in ear cases, there is commonly the steeple-peaked temperature of slow or rapid repetitions, according to the virulence of the infection. In septic thrombosis the symptoms include violent chills and sweats, depression from sepsis and a high leucocytosis. In suppuration of the internal ear, dizziness, nystagmus, often vomiting and deafness, following caries of the middle ear.

The case becomes more complicated when several of these lesions occur together, and of course disaster is more apt to follow. Yet nature is very kind to some patients. I have seen a man walk from his bed to the operating room where a radical mastoid was done, manifesting no special symptoms but enough pain to cause him to consult his physician. On his death the second day after, we found one entire hemisphere covered with pus which trickled on the floor as the upper calvarium was removed. He was an old syphilitic. In another case a lady walked into the office with pus discharging into the external auditory canal from a brain abscess. A third was sitting in a chair, temperature 104°, some pain deep in the ear, but refused at first to go to a hospital, not feeling particularly sick. At the operation on the same day we found a circumscribed epidural abscess, a thrombus in lateral sinus which had broken down and formed pus in the sinus.

These are unusual cases, but they may occur at any time; and they should always be suspected and never passed over lightly when caries of the tympanum is present. Unless one sees a number of such cases with brain complications, he is apt to overlook some common symptom and the patient may succumb; on the other hand, some real prominent symptom may mean very little, but may impress the physician greatly and cause unnecessary worry. The surgeon is often called to operate out of town, not knowing much of the patient's history and acting only on present indications, then not seeing the patient again. Bad results occasionally follow the operation because too little was done; still the patient may have passed away if the exact condition had been ascertained. However, a doctor's conscience is more at ease when he is fairly sure of the status of the patient. If these patients can be observed a few days before and after the operation, one may be able to render better satisfaction. Often operations become necessary when the physician makes his first visit; it is unfortunate, but sometimes circumstances may require immediate action.

One important item must not be overlooked. It is not at all uncommon for patients to deny any former ear trouble. Brain affection due to the ear is at once dismissed, and an opportunity is thus lost to save life. A number of such cases upon examination were found with scars on the drumhead, or old perforations, leaving a good field for developing bacteria. In all suspicious cases the ears ought to be examined before they are dismissed as a factor in meningeal or brain infection.

I would like to call your attention to a procedure of importance which any man may carry out and which will always give him fairly accurate information, and that is the examination of the blood. If there is a moderately high leucocytosis with a normal polynuclear percentage, followed in ten or twelve hours by a mild recession the next day and the following day the same, you may be quite sure the patient has no complication and will speedily recover; if this condition is reversed, there are breakers ahead; and this shows twenty-four to thirty-six hours before any other symptoms are noticed. If, for instance, the patient runs a receding temperature of 106° or more, and the leucocytosis is normal, there is nothing to fear from infection. On the other hand, if the temperature is normal or below and leucocytosis is high—say 20,000 or 25,000—there is something brewing, and rapidly, too.

There are four conditions where the temperature could be below normal in serious cases: brain abscess, sinus thrombosis, shock, and approaching dissolution. If the temperature is taken every hour and a blood count made twice a day where any complications are suspected, one can act far more intelligently than where these things are omitted. Especially is this true with septic sinus phlebitis. You may find the temperature 106° or below normal at your daily visit, whereas, if the temperature had been taken frequently, it would have been found that both extremes occurred on the same day; at any rate, the blood count would have disclosed the approaching danger. Suppose that several weeks after an operation or after an acute attack of some kind, perhaps an apparent simple sore throat, a patient gets a sudden high temperature preceded by a chill, sometimes of considerable severity, lasting for several minutes, and these chills agitate the patient so violently that the bed trembles, the temperature rising thereafter and at times receding in a few hours, at other times remaining stationary a few hours, then declining slowly, and that process may be repeated at intervals of a few days to a week or more; pain may be present in some distant part of the body, and apparently no connection with the lesion in the throat or ear, yet there is undoubtedly infection localized somewhere, remote from the original disease. This is peculiarly the case with embolic infection. The immediate effect is a rise in temperature for a short time only. The leucocytosis may be disturbed and run to a height of 20,000, polynuclear percentage nearly up to the limit. In one case it was found to be ninety-eight per cent, more often it is not over ninety per cent. Such patients may have considerable pain, or the temperature rises, but, however, gradually subsides until another spot becomes infected. These areas of infection take place anywhere—liver, spleen, brain, lungs, joints, etc.

Endocarditis is a common cause for such abnormal temperature, and this condition is not always easily made out. I believe it is oftener found after operations. However, the rule is that these patients usually recover. When this condition occurs early after an operation, or some septic disease, and the patient does not improve rapidly, the streptococcus or diplococcus capsulatus is the probable cause and the patient succumbs. The blood count will usually indicate the severity of the infection. These patients can often be saved if the diagnosis is made early. They usually recover when a distant vein is affected. The same condition exists in endocarditis. Unless the infection is carried to some other part of the body, no special difference is noticed in the temperature; but should an embolus affect any other organ, the temperature shoots up three or four to six and eight degrees. But if the patient ultimately recovers, the temperature recedes rapidly and the constitutional effect is not marked at all.

The temperature in each one of my cases was postoperative, but it occurs in any kind of infection except where there is much shock. We notice the high and low temperature in septic sinus thrombosis, but we do not know about the thrombus until this peculiar temperature occurs, so a patient is liable to succumb before a diagnosis can be made. Marasmic thrombus usually causes no such temperature, nor does a thrombus anywhere in the body where it is thoroughly organized.

A similar condition of affairs exists in infection following tonsillitis, arthritis (commonly called rheumatism), pneumonia, periostitis and bone necrosis or abscess, remote from the throat lesion. But the infection, seldom traced to the throat, since it comes on several weeks after the throat has apparently recovered, is, nevertheless, due to the lymphatic absorption and final distribution to remote distances. This explains many affections hitherto treated as idiopathic diseases. Furthermore, where lymphatics are abundantly distributed, the presence of infection, even though mild, is rapidly manifested. This is true in sinus disease, which may cause rapid rise in temperature and a lymphangitis of the brain with very severe pain. But a more palpable illustration is found in septic deposits, as in the heart or sinuses, or even after abdominal operations. The sinuses of the brain give splendid opportunity for demonstration.

When a septic thrombus forms, there are no other symptoms than those commonly found in any other infection; but where a particle is carried into the circulation, there will be a sudden rise in temperature commensurate with the degree of infection; and every time such embolus has made its call in a remote part of the body, we get a repetition of the high temperature. As these points of hesitation are small, the temperature remains high but a short time and commonly recedes in a few hours to recur again and again. It is one way nature has of letting us know the condition of the patient, and many lives have been saved because of recognition of this symptom.

The peculiar temperature shown in the charts are all due to chemical or organic emboli, and all recovered as predicted, for the prognosis is always good when the constitutional symptoms are mild, regardless of the high temperature.

The chart No. V is so arranged by Kopetzky that when the polynuclear percentage is less than the total leucocytes, the line runs downward. This indicates good resistance and good prognosis. If the opposite occurs, look out for trouble. The blood counts should be made every ten hours, or at least twice a day.

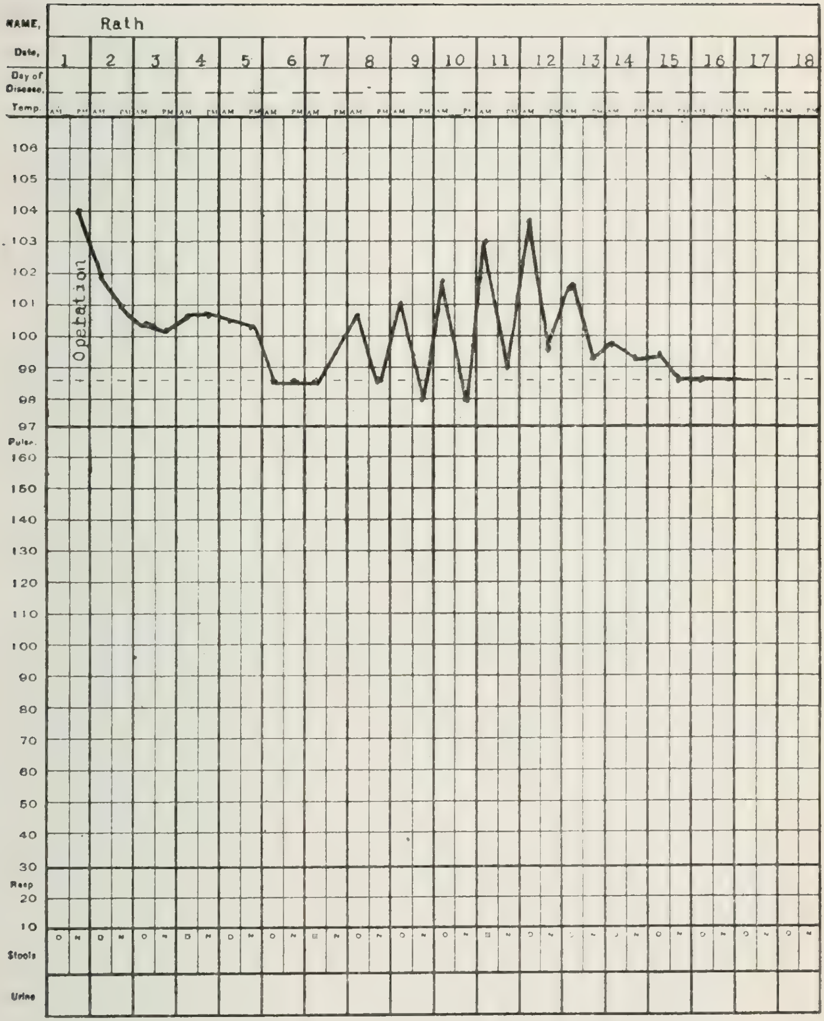

Chart I, Case 1. Radical Mastoid Operation.

Sinus thrombosis, which had broken down and formed pus in center; epidural abscess. After operation temperature fell to normal; after the seventh day temperature rose and continued to rise and fall for a week, then gradually recovered. At the height of the fever, which reached 104.5°, the consulting surgeon said the patient would die, with which I disagreed. Recovered.

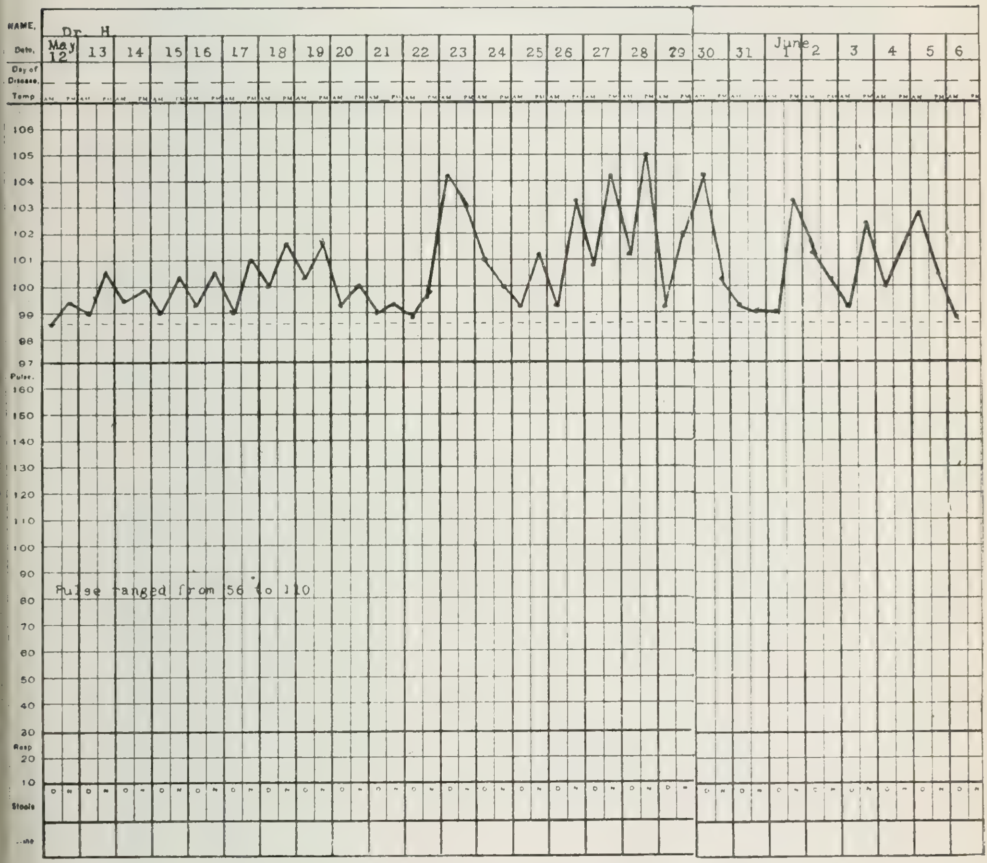

Chart II, Case 2. Radical Mastoid Operation.

Caries. Fifth day after operation, temperature rose and continued to rise and fall for a week. At the end of that time, in consultation with two eminent men, an internist and a surgeon, it was decided to explore the lateral sinus. But the next day the temperature returned to normal and I put off operation. Final recovery.

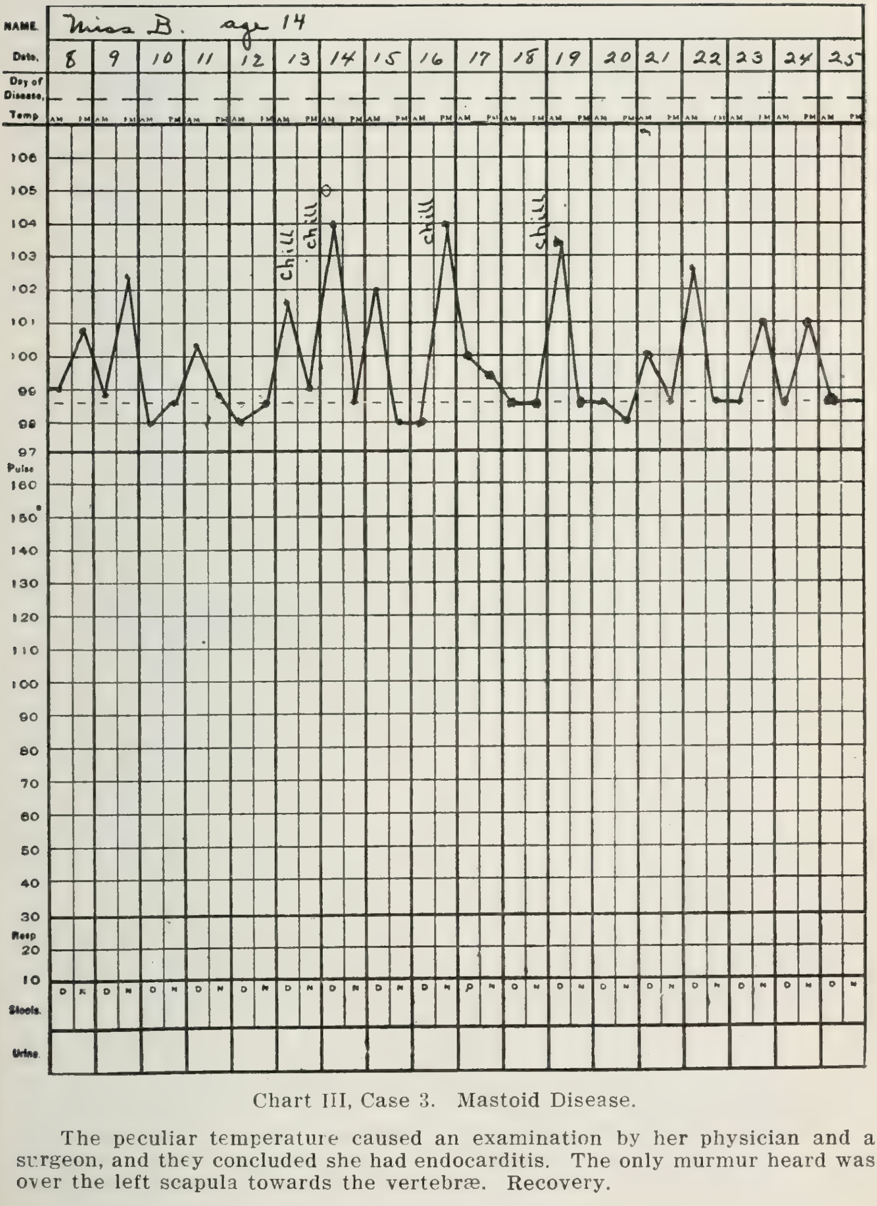

Chart III, Case 3. Mastoid Disease.

The peculiar temperature caused an examination by her physician and a surgeon, and they concluded she had endocarditis. The only murmur heard was over the left scapula towards the vertebræ. Recovery.

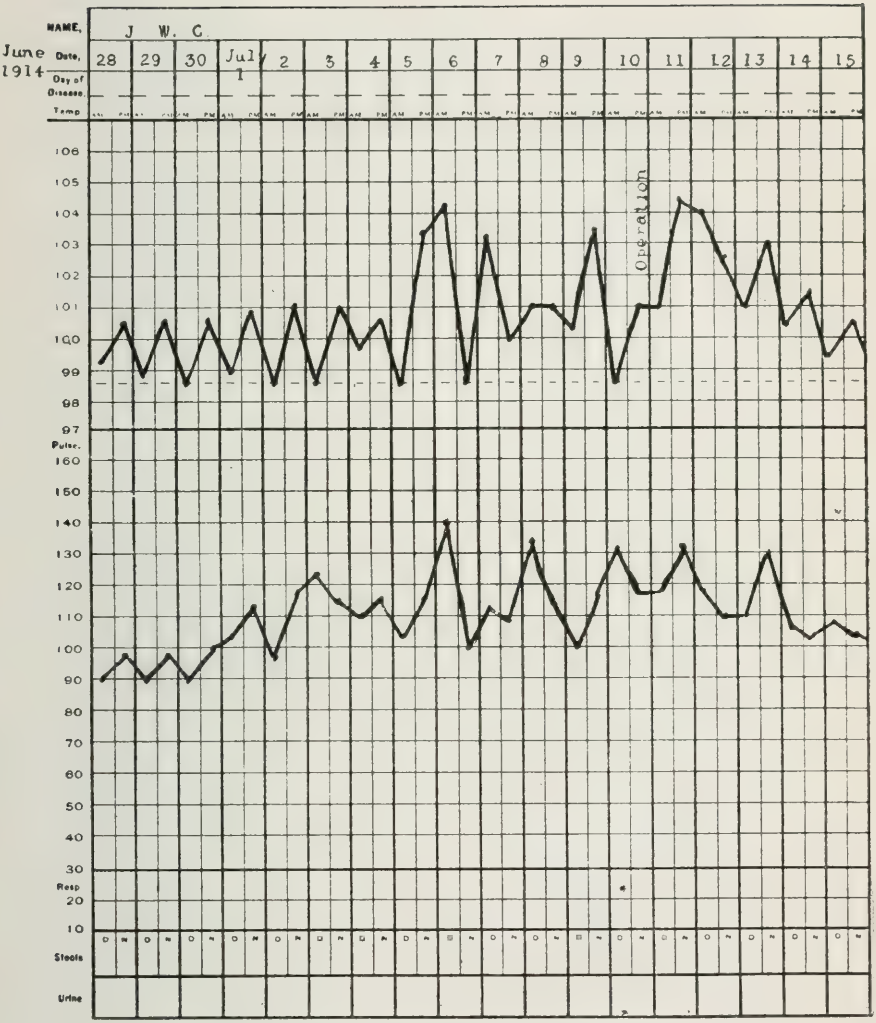

Chart IV, Case 4. Radical Mastoid Operation.

Patient thought to have typhoid fever; after two weeks drum head ruptured and discharged pus for about ten days, when I saw him. His trouble was supposed to be acute mastoiditis. Found sclerosis due to recurrent attacks; mother denied previous ear disease, but acknowledged boy had complained of earache off and on. Red cells, 4,250,000; white cells, 10,000. Lingered for several weeks after he left hospital, then recovered.

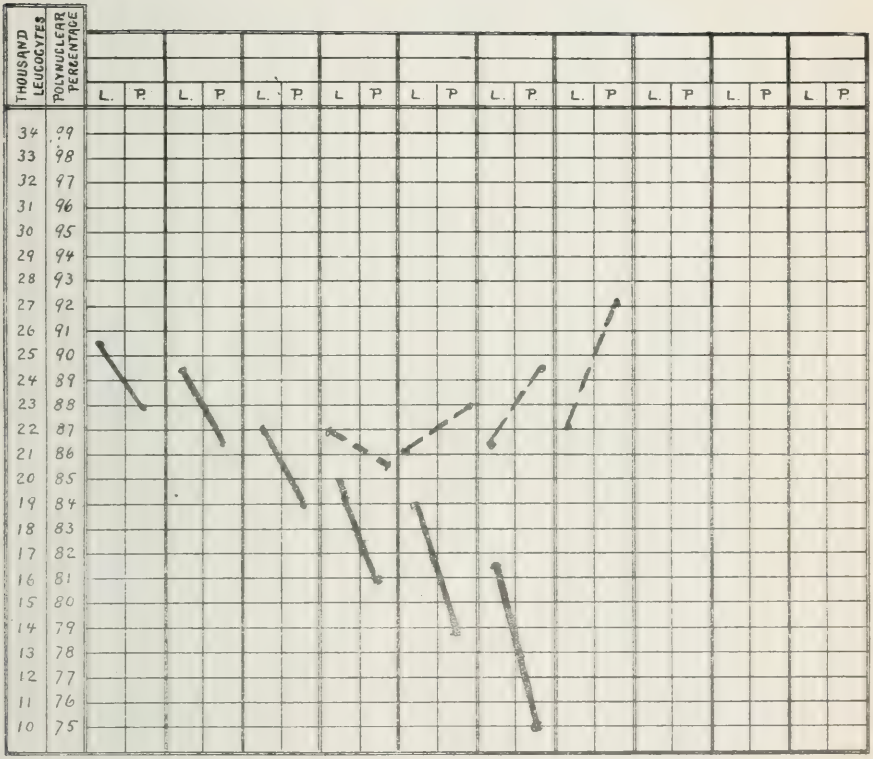

Chart V.

Arranged by Dr. Samuel J. Kopetzky.

SOCIETY PROCEEDINGS.

NEW YORK ACADEMY OF MEDICINE, SECTION ON OTOLOGY.

Meeting of October 9, 1914.

Paper: Specific Nerve Deafness; Treatment With Salvarsan and Pilocarpin.

By James Garfield Dwyer, M. D.,

New York City.

(No discussion.)

Paper: Systemic Infection of Middle Ear Origin in the Exanthemata.*

By Charles R. C. Borden, M. D.,

Boston.

(By Invitation.)

DISCUSSION.

Dr. James A. Babbitt, of Philadelphia (by invitation): This paper just presented by Dr. Borden was replete with interesting information, and I wish personally to very much thank him for his courtesy in presenting it to us. My acceptance of this opportunity of discussing the paper was not on account of any superior knowledge which I may have on the subject, although I have become much interested in it on account of my connection with an institute near Philadelphia, but because of the pleasure of meeting with you gentlemen again and of hearing this presentation which has been given to us.

It has told several new points of interest in a subject which has been more or less investigated and demonstrated before. The three exanthematous types of the paper—measles, scarlet fever, and diphtheria—present in a certain measure analogous types of acute and rapid infectious diseases, perhaps emphasizing in scarlet fever the persistent infective sequence; in diphtheria, the profound and rapid toxemia; and in measles, the persistent after-depression.

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*See page 1.

I found quite a record of statistical investigation on the relation of these to otitis media—representing numerically from five to fifteen per cent of association between the two —and the specialized statistical report in relation to deaf-mutism. The more common complications of this exanthematous type are otitis, albuminuria, endocarditis, and, closely following in frequency, arthritic involvements and pneumonia.

The middle ear disease becomes a cause of low resistance, depending upon the organism, streptococcus, staphylococcus, pneumococcus, etc.

Bezold emphasizes the absence of all ordinary symptoms of ear trouble save deafness as being a common characteristic. Personally, I would not fear the use of anesthesia, which could be used in very minor quantity and in conjunction with topical iodin or carbolic application.

Widespread knowledge and acquaintance with paracentesis has, in my judgment, rendered the percentage of otitic cases far less in later years. Fatal otitic cases are on frequent record, and I recall two which were associated with marvelously widespread infection, in which the streptococcus was even found present in the urine, and subsequently found by autopsy in almost every cavity of the body. Diagnosis of this complication is facilitated by peculiar toxic evidence in the patient.

Unfortunately we do not know just where an aural complication to scarlet fever and measles may lead us. It has not been my experience to have much complication follow diphtheria. I would like to record a very recent case in which mastoidectomy subsequent to measles became necessary, in which the surgical operation was followed ten hours later by a temperature of 106°, and two days later, in the night, with a cardiac collapse which was nearly fatal, but the patient subsequently recovered.

It was my pleasure in accepting this discussion partly to gain some light upon this otitic element, namely, that connected with the suppurative discharge as a carrier of infection. I have read the record before me of a case in my charge in one of the deaf and dumb institutes near Philadelphia, in which in February and March, 1914, nine children and two adults were sent to the municipal hospital with scarlet fever. I quote the words of the head nurse in a letter sent me: "In February and March, 1914, we had nine children and two adults; all went to the hospital, one child dying after being in the hospital three days. We tried in vain to find out if the first cases had been exposed to the disease, but could not. A doctor from the Board of Health thought that it might have come from a child who in May, 1913, had become deaf from scarlet fever, and had an ear discharge after coming to us in December, 1913, from Erie. Just previous to the outbreak this boy had had some discharge from the nostrils, while the ear discharge had almost disappeared. The Board of Health thought he might be the cause and sent him to the hospital, where he was for two weeks."

I should be very glad to have Dr. Butt and Dr. Borden allude to that element of the carrying possibilities, especially the interval, as it would be a great help to some of us, I am sure. We are being rapidly educated to the necessity of prompt and sometimes rapid surgical measures in connection with the ear.

I want to add my thanks again for Dr. Borden's paper, which is a help in convincing me on certain points about which I was delaying decision. It has been a great pleasure to discuss the paper.

Dr. D. Bryson Delavan expressed his indebtedness to Dr. Borden for the admirable paper on a subject more or less familiar, but presented with so much force and clearness. In Dr. Delavan's own opinion, the facts which the reader of the paper had particularly emphasized, namely, the dangers of the nonrecognition of the aural complications in the exanthemata, and of delay in meeting them when present, have had very serious consequences. Of course, their seriousness with regard to risk of life is at once recognized, but there are many examples where, though life was not sacrificed, the hearing had been permanently destroyed in one ear or both, from one of the attacks to which the essayist had referred.

Even with no greater risk than that of loss of hearing, the operative procedures which are called for in such cases certainly ought to be employed. Dr. Delavan said that it was hard to understand why operation should be delayed where the risk was so great. Such delay was generally due to the lack of education on the part of the public as to the importance of operation. If surgeons were given full permission to treat these cases as might be required, doubtless more lives could be saved.

With regard to the use of anesthetics in these cases, as Dr. Babbitt had just said, there seemed to be no reason why anesthesia should be withheld when the necessity for operation was so urgent.

Dr. Charles G. Kerley said that in discussions by specialists, the general practitioner usually came in for more or less condemnation. He was sure that the reason why the practitioners failed to recognize acute ear disease in children was because of their faulty teaching by the aurist. The teaching is that in an acute otitis in children there are evidences of pain, such as head rolling, ear tugging, ear boring, crying, etc. In infants, pain is an unusual manifestation of an acute process in the middle ear. In his own cases seventy per cent failed to show signs of pain.

Aural complications in diphtheria are infrequent. Scarlet fever and measles have a definite fever cycle of five or six days. When the temperature in these diseases continues after the usual temperature period, it is very possible that the ears may be involved. During scarlet fever and measles the ear should be under daily observation, the same as the heart and lungs, and then when trouble arises it will occasion no surprise. Every physician who treats measles, scarlet fever and influenza should be familiar with the appearance of a normal ear drum, and then he will be able to determine when disease attacks the parts.

Athreptic infants very frequently suffer from acute otitis without even the symptom of fever, the only manifestation being progressive loss in weight and general poorness.

Dr. Kerrison said that in cases of the acute infectious exanthemata the serious influence of a severe middle ear and mastoid infection in depressing still further patient's resistance and vitality was generally recognized. The conclusion that all such cases should be subjected to a mastoid operation was not, however, justified. There were some cases in which the need of prompt operation was urgent and unquestionable. There were others in which, in spite of clear indication of mastoid involvement, it was safer to delay operation until the patient had recovered from the systemic infection. Such delay was justifiable and wise in many cases in which a large perforation allowed free drainage, and the symptoms of septic absorption from the ear were not present. The question of operation should be determined only after careful consideration of all the symptoms present in each individual case.

Dr. Kerrison said that he did not believe any dogmatic rules or conclusions as to the indications for any operation during the course of the infectious diseases could be safely made.

Dr. Matthias Nicoll, Jr., said that he wished to make a few remarks, based on a long experience in treating infectious diseases. With regard to noma, Dr. Borden had said that it only occurred after measles. He himself had seen eleven cases in the scarlet fever service.

Dr. Borden had spoken of the advisability of operating in the course of acute septic scarlet fever, even when there were no marked symptoms of mastoid disease, on the principle that this might be present. Dr. Nicoll said that such action did not appeal to him at all. He would hardly expect that a general sepsis, as shown by blood culture, together with myocarditis, arthritis, and nephritis, would be improved by the removal of a drop or two of pus from the mastoid cells. The shock of such an operation was too great to justify any theoretically good results which might follow.

With regard to ice coils, of which Dr. Borden did not approve, he did not know what was the consensus of opinion of aurists, but he had seen cases with every symptom of mastoid disease, in the course of scarlet fever, which had recovered very promptly without operation, apparently as a result of this treatment. As to the use of antistreptococcus serum in severe cases of scarlet fever, while the results had been by no means uniform, in his experience the use of it in large doses had been the means of saving a number of patients whose condition was apparently hopeless.

Dr. Nicoll said that there was little or no cooperation in contagious disease services between the regular attending physicians and the visiting aurists in making systematic study as to the prevention of infection of the middle ear and mastoid, especially in scarlet fever cases. As a rule, the resident staff performs paracentesis when necessary, and if the aural discharge persists, or there is evidence of mastoid involvement, the case is turned over to the care of the aurist, to be operated on or not, according to his judgment. Again, in the treatment of nasopharyngeal diphtheria, it had been the custom, for many years, at the Willard Parker Hospital, to irrigate the nasopharynx with large quantities of warm normal saline under low pressure, the child being closely confined in a sheet pinned about the body. He ventured to say that there was hardly any one present who would approve of this procedure, for the theoretic reason that it would result in the forcing of infectious material into the eustachian tubes and thus set up disease of the middle ear. As a matter of fact this did not occur, in proof of which he called attention to the fact that otitis media rarely occurred in the diphtheria service, and mastoid operations were practically unknown. On the other hand, the nasal irrigations had proven to be of the greatest value in clearing up the local condition.

In deference to otologists, such irrigations had not been practiced on the scarlet fever service, and yet when one considered with what uniformity ear disease follows certain types of scarlet fever, it would seem that nasal irrigations could at least do no harm and might conceivably be of benefit as a preventive measure.

Dr. Nicoll said that he did not believe it was possible, with the present state of our knowledge, to lay down a rule as to how long after the occurrence of scarlet fever, discharges from the nose, throat, middle ear, and mastoid operation wounds were capable of causing scarlet fever in others. As long as such discharges were present the patients should be regarded as a menace to susceptible persons with whom they came in contact.

Dr. Kenefick said that the subject had been treated so completely by Dr. Borden and by those who had discussed it, that little remained to be said. The last speaker had struck a most important point—the prevention of these conditions. He had said, however, that the otologists do nothing to prevent otitis in the infectious diseases. On the contrary, Dr. Kenefick said, the otologists are all the time urging upon the pediatrists, the general practitioners, surgeons, and every one concerned, the great importance of having the nasopharynges of all children put in proper shape, under at least three years of age, thus greatly lessening the chances of infection, and, above all, permanently establishing the proper physiologic function of the eustachian tube. His experience of ten years at the New York Foundling Hospital had demonstrated to him the importance of these measures.

Dr. Eagleton said that in the city of Newark all the contagious diseases come to the City Hospital. One of the earlier speakers had stated that there was no cooperation between the otologists and the attending physicians. In the beginning of his service at the City Hospital, the otologist was accustomed to go there one afternoon each week, and it was his duty to examine the ears of all his patients—some of them every day—of his service. At that time it was customary to discharge a large number of patients after scarlet fever with the loss of hearing of one ear. Gradually, however, the importance of early attention in these cases was recognized, and a very thorough routine was established, which is continued today. When the patient is admitted the ears are examined, and if they are found to contain detritus and the drum is a little red, and this continues for a second and a third day —then, without waiting any further for any bulging or pain, a paracentesis is made. This is generally followed by a very profuse serous discharge for a few days, and that is all there is to it. Under this line of treatment, there have been no mastoids and no chronic running ears.

Dr. Borden had spoken of operation for acute sepsis, and the importance of this should be emphasized. In operating for acute sepsis from scarlet fever, the following day the wound is frequently found to be covered with a thin diphtheritic membrane, and on the third day there is a discharge from the wound; but if they are operated early they invariably do well. It is, therefore, well to operate early in cases of acute sepsis, and not to wait for it to subside. As shown in the albuminuria caused by the otitis, it is found that a large number of these cases have nephritis; but it does not add at all to the danger of the operation.

In regard to the carrying of infection, Dr. Eagleton told of a boy named Willie K., who had spent almost his whole life between the babies' wards and the ear infirmary. When he was a small child he contracted diphtheria and had a running ear. He was operated upon, but the discharge still continued, and he was taken to the Babies' Hospital. He has been operated upon twice, and has come back to the ward three times with chronic diphtheria. He has been going back and forth from one of these institutions to another for at least four years, with a positive culture in a discharging ear.

DR. WILSON said that the members of the section were indebted to Dr. Borden for coming before them and again insisting upon the necessity for an early operation in these mastoid cases in scarlet fever, especially those complicated with joint disease, nephritis, etc. Dr. Delavan had spoken of the public not being educated in regard to this. The public never will be educated to it until the otologists themselves are educated to it. Many have been loth to operate early in these cases, fearing the effects of the administration of ether, shock, etc. Dr. Wilson said that he himself, after hearing Dr. Borden's paper a year or two ago, had made up his mind that he would operate early in these cases, and he has seen no occasion since to change his mind.

DR. BORDEN, closing the discussion, said that as he had read three papers on various phases of this subject, he had been compelled to try to make it somewhat different, and had purposely left out reference to preventive measures, but as the discussion had gone that way, he would like to add a few words. Several years ago he had read a paper based on four hundred and fifty autopsies. His attention had been directed to them by one of the younger pathologists in the Boston City Hospital. He had gone over all of these cases, and the majority of them had middle ear and mastoid conditions. Of these four hundred and fifty cases the mastoid was studied in about two hundred and fifty instances; eighty-four were diphtheria cases; ninety, scarlet fever cases, and one hundred were measles cases. All had pus in the middle ear or mastoid. That is about the ratio in which they occur in most clinical cases. Very few statistics have been given in diphtheria. In his own cases, they occurred in a little less than four per cent. There is a great difference in clinical cases; between four, twelve, and twenty per cent. A curious point in regard to these cases is that when we consider the mastoid, the order is reversed. Thirty cases of diphtheria showed mastoid conditions. Most of his papers had been based on the statistics from these autopsies.

As to the importance of radical operations, there was but one more thing he wished to say. Dr. Leland had stated that for the first nine years of his service in the contagious department of the Boston City Hospital he had operated on every mastoid in every one of these diseases, regardless of the condition of the patient, and had never had a death in all that time. At the end of the nine years there was one death from lateral sinus thrombosis. Dr. Borden said it was about that time that he himself came to the hospital, and he had never had but one death, and that occurred in measles from pneumonia, a week after the operation. It was not at all certain that the operation had anything to do with it.

Dr. Borden said that he had been considerably criticized in regard to the position he had taken in regard to operating on these cases, but he did not know of any institution that could show better records—most of them in Boston and others in Brookline.

On almost every occasion where he had read a paper before specialists there has been rather bitter discussion—the question of aural infection, and the question of irrigation, sprays, and all manner of cleansing operations had been presented. Replying to what had been said in the present discussion, he stated that a year ago it was the custom in the Boston City Hospital to irrigate all cases. At that time there were a great many more mastoid cases than they have now. Dr. Moss had told that in the early days it was common to feed many of these cases with a nasal tube, and then the number of middle ear infections was very great. In Dr. Borden's own opinion, the only method of preventing aural infection is by removing any existing adenoid material. A few years ago he had had as many as twenty-eight mastoid cases in one month. Since they have been removing the adenoids from the poor children of the city, the number of mastoid cases has materially decreased.

One of the gentlemen had spoken of the characteristics of these complications in scarlet fever and measles. In his own experience, it is characteristic of measles that these complications occur in the active period of the disease. If the patients go beyond that period without trouble, they are practically safe. Another characteristic of measles is the strong liability of adult cases to acquire mastoiditis from the middle ear. Adult cases of scarlet fever are not especially liable to mastoiditis. In measles, they are very liable to it. Very few mastoid conditions occur in diphtheria, but when they do occur, they are puzzling. In some of the cases he had seen, after watching for days and days it was finally decided to operate, simply because nothing else could be found to account for the conditions. In some of the cases that have been operated upon there were absolutely no signs of a mastoid condition, and yet a marked effect was going on. Why this was he could not say.

The question of the virulence of the infection had been raised—particularly in institutions. There is a reason for that. In almost all institutions, particularly children's institutions, the inmates have very poor vitality. In the Boston Hospital, for instance, they know that if a patient comes from an institution, it will probably be a very bad case and will probably have complications; if it is what is called a middle class suburb, there are very few complications. Brookline is above the average in wealth, and the patients from there are seldom very ill.

What Dr. Kerley said was true. Young children, as a rule, do not have pain.

In describing the fatal cases in scarlet fever, the mastoid was said to be filled with white, creamy pus; but the diphtheria cases almost all had thick, semisolid, glutinous, and brownish pus, or some other color. It seems to be a very peculiar condition of the mastoid. Lateral sinus thrombosis seldom occurs.

What had been said about the delay of the average aurist in operating was very true. He does not give these cases proper attention.

The most important part of the paper was what had been said about perforations. To Dr. Borden, that in itself was an indication for a mastoid operation, and if allowed to go on for many years it will slough out and leave a large hole.

In all the discussion, nothing had been said about the hearing apparatus. One of the reasons for the mastoid operation is not only the saving of life, but of hearing. To make repeated paracenteses and expect a violent inflammation to drain dry through it, seemed very poor surgery. Another thing is the large incision one is called upon to make for it, because it makes no difference. A large incision extending half way across the drum will in twenty-four hours be of the same size as a small puncture.

It is to be hoped that the time is not far distant when a mastoid operation will be considered in every case where there is a profuse aural discharge lasting for two or three weeks, and it is up to the aurist who allows an ear discharge to continue for day after day and week after week with no other treatment but irrigation. It is altogether a question of the vitality of the patient. If the patient's vitality is strong, then the bacterial discharge will probably cease, but many drums are destroyed every year simply because the aurist has not the courage to open the mastoid and drain it through a large incision, rather than to do a little pinhole operation.

Dr. Borden reiterated that what he had said in his paper referred only to serious cases and not to the mild ones. When he had studied the autopsy reports previously mentioned, he was at first entirely at a loss to understand their real significance. Finally, he decided that the most important point was the influence of the ear upon other parts of the body. He then studied the clinical records, and found in many cases complications of the lung, kidney, etc., the symptoms would subside after drainage from the ear had been established.

One very important phase of the situation no one had mentioned is the low vitality of the patient. The second case mentioned in the paper was that of a trained nurse, a strong, healthy girl previous to the attack of scarlet fever. There were no complications in this case other than in the ear and mastoid, yet the prostration was very great.

The influence of climate was marked, as was the time of year.

Referring to Dr. Reik's statement with regard to the proportion of mastoid cases in hospitals, it may be said that a much greater percentage of aural complications occur in large charity hospitals for contagious diseases than in any other institutions. This is well illustrated by the difference between the Boston City Hospital and the Somerville Hospital compared with the Brookline Hospital.

Dr. Borden's attention was recently called to tertiary syphilis as a possible cause for chronic otitis media or mastoiditis. A routine Wassermann test was made in a considerable number of cases, but failed to show a single positive reaction.

Too much reliance has been placed upon paracentesis. The textbooks speak of a long incision in the drum membrane. He had performed all manner of incisions, but within from twenty-four to forty-eight hours each would heal, leaving a pinpoint opening as before. The chronicity of aural complications is due to two factors, viz.: the lowered vitality of the patient, and the virulence of the infection.

When a case is watched day by day and the perforation is found to be growing steadily larger, the mastoid operation is indicated. As to postnasal complications in mild cases, the local applications might do good, but are absolutely of no avail in serious cases. According to the pathologists who performed the autopsies previously mentioned, the sinuses were involved in a large percentage of the cases.

Answering the questions as to how he dared give ether in serious cases, he would say that he had given the anesthetic in almost every variety of complication, and had never known harm to result. On the other hand, the operation was followed by distinct relief.

NEW YORK ACADEMY OF MEDICINE, SECTION ON OTOLOGY.

Meeting of November 13, 1914.

Paper: The Difficulties in Closing Perforations of the Drum Membrane in Certain Cases of Acute Otitis Media.*

By Gorham Bacon, M. D.,

New York City.

DISCUSSION.

Dr. Whiting said that any suggestion offering a reasonable probability of overcoming persistent perforation of the ear drum was worthy of careful consideration. He himself had never used the trichloracetic acid of which Dr. Bacon had spoken, but he would certainly give it a trial. ' Many of these cases are very slow in healing up, and various measures have been tried to stimulate regeneration of the drum. He also said that he had tried chromic acid and the galvanocautery for this purpose, but the results had not been very satisfactory, and in several instances the openings had been made larger than before. In his experience he had found the goldbeater's skin to act better than the paper covering of the opening, as it holds in position better the ordinary cargile membrane. It is easier to apply and to keep in position. The suggestion of trichloracetic acid, however, seemed very timely and likely to prove effective.

Dr. Lederman said that he wished to corroborate what Dr. Bacon had said about trichloracetic acid, as he has been using it for over ten years and had found it especially useful in some subacute and chronic cases. For covering over perforations which would not close, he has used the ordinary rubber tissue, cutting it the proper size and changing it from time to time as it becomes hardened. It seems to act very nicely. Dr. Gleitsmann had suggested the use of trichloracetic acid years ago, following the application of the galvanocautery in nose and throat therapy, to limit the reaction which frequently appeared. It acts as a stimulant and leaves a very nice, dry eschar, causing very little local disturbance.

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*See page 59.

Dr. Bacon said that he was pleased to hear that Dr. Lederman had used the trichloracetic acid for so long. He himself has been very much pleased with its action, as it has proved better than anything he had tried before. He has used it in a number of cases with very satisfactory results.

Replying to an inquiry, Dr. Bacon said that he uses the trichloracetic acid in concentrated solution.

Paper: Mastoid Skiagraphy as a Surgical Diagnostic Aid.

By George S. Dixon, M. D.,

New York City.

DISCUSSION.

Dr. Bacon said that the hour was so late he must be very brief in what he had to say, but that Dr. Dixon was to be congratulated on the wonderful work he has done in skiagraphy. At the New York Eye and Ear Infirmary the valuable assistance he gave in diagnosing doubtful cases was greatly appreciated. He felt that the clinical symptoms were the most important in making a diagnosis, but that skiagraphy was a valuable aid in doubtful cases. In one of the doubtful cases to which reference had been made, the patient was seen on January 10, 1914. He had pain in the ear in March last, preceding a cold, and had also had pain in the mastoid process. The drumhead was incised several times. The membranes healed in a month's time, but the patient was not entirely well until a month later. That was before he came under observation. When seen January 10th he had had no trouble until two weeks ago, when he took a cold and had pain again, and the drum perforated spontaneously. He had severe pain, not only in the ear, but on the side of the head, and a temperature of 99 3/5°. The pain was described as of a throbbing character. As he had given a history of previous trouble with pain, and since he had a slight rise of temperature, he was sent into the eye and ear infirmary for observation, although the drum membrane remained perfectly clear, with all of the landmarks visible, and there was only a slight tenderness over the mastoid process. That was the case which Dr. Dixon showed with a pneumatic mastoid, and the cells were identical on both sides. The patient had this severe cold and all of his mucous membranes were more or less inflamed, including the nose and sinuses. He was treated for this condition and cured, and left the hospital without operation. In this instance the skiagraph was a great help, for otherwise an exploratory operation on the mastoid process would have seemed necessary.

Dr. Dench said that every one appreciated the importance of the work done by Dr. Dixon, especially as he had undertaken it with the idea that it would not accomplish very much. Certainly the plates that had been shown testified to the great advance that has been made in developing this work so as to afford valuable assistance in diagnosis.

One of the plates had proved particularly helpful. Although it was positive, the case did not come to operation. So far as Dr. Dench knew, this was the only instance in which they had a positive plate without operating upon the patient. The clinical symptoms outweighed the evidence of the plate, and upon Dr. Dixon's advice he did not operate.

In another case, shown early in the evening, the patient was a diabetic, and had a streptococcus capsulatus infection. He seemed to be doing very well, but on account of the X-ray plate an operation was performed, and it showed exactly what the plate indicated. The man made a recovery, but excepting for the evidence of the plate it would have been thought that he was doing well, and the case would probably have terminated fatally.

In the case where Dr. Dixon had showed an abscess over the sinus, the condition ran for a long time, a capsulatus infection, but the man had no pain. He was operated upon, however, and the condition found was just what had been shown by the plate.

Dr. Dench said that of the two plates showing epidural abscess, one was a very obscure case. Everything cleared up. The patient came in with a narrowing of the canal. Plates were made, and he and Dr. Dixon studied them very carefully and found two spots over the sinus. Epidural abscess was suspected, and operation confirmed this finding. The two spots over the sinus were found with erosion of the walls of the sinus.

In the plate showing the broken down mastoid, he had seen the patient in consultation, and the operation was performed by a confrére. The mastoid was found to be broken down, just as shown in the plate.

Another one of the plates showed a very interesting development to which Dr. Dixon had referred. Ten years before the patient had had an attack of otitis, which was cured. Then she had a second attack—a pneumococcic infection; and this year she had a third infection, with capsulatus. In that case the X-ray plate was a little cloudy. The patient made a perfect recovery. The cloudiness was probably due to the previous attacks she had had. It should always be borne in mind that the patient may have had previous attacks which went on to sclerosis—sclerosis secondary to a suppuration. That emphasizes a very important point which has been brought up by Mr. Cheatle—whether sclerosis is the result of an inflammation, or whether it represents the infantile type of mastoid and is the cause of a chronic suppuration. These plates show that in a large proportion of cases a sclerotic mastoid is the result of suppuration, and not that the suppuration is the result of an infantile type of mastoid.

Dr. Whiting said that one of the cases which Dr. Dixon had presented served to show how valuable this assistance may prove under some circumstances. The patient was a young man who contracted middle ear infection while sailing in the South Seas, and he could not have proper attention for ten weeks. His ear had discharged for four or five days; but by the time he reached New York there was no evidence that he had any suppurative process, much less a mastoiditis. He came to Dr. Whiting because of a feeling of numbness on that side of the head, and when he shook his head he experienced pain. Inspection revealed nothing to indicate any suppurative process; but the patient was sent to Dr. Dixon for a corroborative diagnosis, for the bone was somewhat tender over the region of the emissary vein. The plate showed that there was suppuration of the mastoid cells, the case was operated upon and an extensive destruction of the bone was found with epidural abscess. Under ordinary conditions it would have been impossible to have made that diagnosis.

Dr. Whiting said that the plates which Dr. Dixon had presented were seen under most disadvantageous circumstances. The plates require a very brilliant illumination, and any one who had not seen them under such conditions might think that perhaps a good deal was taken for granted; but under favorable illumination the method which Dr. Dixon had illustrated was of very great assistance in cases which are difficult to diagnose.

Dr. Kenefick said that he wished to join with the other surgeons of the New York Eye and Ear Infirmary in acknowledging the value of this aid and also to express his especial indebtedness in cases with obscure diagnosis, and told of two cases, then under observation, in which it was expected that Dr. Dixon would clear up the diagnosis.

In Dr. Dixon's description of the plates, one or two points of especial interest had been brought out. One of these was the similarity between pictures of the infantile or sclerotic type of bone and bone in which the septa are broken down and the resulting space is filled with granulations or pus. A plate had been shown of a case in which the diagnosis was said to be either "purulent" or "sclerosed." Evidently this important point cannot yet be determined definitely by skiagraphy, though it will probably be cleared up in time. In certain fulminating cases of acute purulent otitis which can be explained only by a possible dehiscence in the roof of the tegmen tympani, it would seem that by prompt skiagraphy some helpful information might be obtained.

Dr. Law said that he had been very much interested in Dr. Dixon's demonstration, and that all who were interested in this subject were indebted to him for a great deal of very excellent work. No one who had witnessed it could fail to be impressed, for he had instructed many on points which they would not otherwise have learned, as it requires a great deal of time for surgeons to go to the hospital and look up such studies. At the Manhattan Eye and Ear Hospital they depend a great deal on the X-ray and consider it a most valuable aid, particularly in obscure cases. Their technic differs somewhat from that employed by Dr. Dixon, but they obtain pretty much the same results.

Dr. Kenefick had spoken of the difficulty in differentiating between sclerosis and pus. It is possible to tell the difference; with a good plate, there would be no mistake made between a true sclerosis and a collection of pus.

Dr. Dixon had said that he had not seen a plate showing a clot in the sinus. Such a plate is in the possession of the Manhattan Eye and Ear Hospital. The diagnosis, however, was not made from the plate, but after operation the plate was studied and the clot noticed.

Dr. Lewald expressed his appreciation of Dr. Dixon's work as shown in this demonstration. It was really epoch making, especially when it was remembered that the doctor was somewhat skeptical of its value when he began it. The excellence of his technic has proved that there is a great deal of value in it. Dr. Lewald has been using the stereoscopic method in his cases, and believes this gives information which can be obtained in no other way in certain cases, but for routine work Dr. Dixon's method is certainly the best one he has seen.

Dr. Stewart said that he had been engaged in this line of work for about two years, and it was very gratifying to see that the surgeons are at last taking advantage of its aid in the diagnosis of diseases of the mastoid region. The roentgen findings must still, however, be closely associated with the clinical picture in order to be of depenable value. His own technic differs somewhat from Dr. Dixon's, but the end results seem much the same. He expressed his appreciation of the demonstration.

Dr. Dixon, in closing, said that he had done all he could to show the original plates to the best advantage, and, making due allowance for unavoidable crudities in the projection apparatus, thought the result was fairly satisfactory.

As to the difference between pus and sclerosis, he thought this could be determined in the majority of cases, but not always. In the case of a sclerosed bone with a few cells or spaces and a thick cortex, there might be plenty of pus, and the result would be a white plate.

As to a clot in the sinus, he would not care to make a diagnosis of sinus thrombosis from an X-ray plate. It might be found in the plate after operation, but that would not be of much use to the patient.

JOINT MEETING OF THE CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY AND CHICAGO SURGICAL SOCIETY.

Held May 1, 1914.

DR. OTTO J. STEIN, THE PRESIDENT OF THE CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY, IN THE CHAIR.

Ventricle of the Larynx.

DR. GEO. SHAMBAUGH exhibited a ventricle of the larynx which had been split open and the appendix could be seen running up half way to the top of the thyroid cartilage. The appendix of the ventricle varies, not only in different individuals, but on the two sides. It is always present. It may exist as a slight pitting or depression; at other times as a prolongation that extends up not only as high as the top of the thyroid, fully an inch, but also up to the hyoid and base of the tongue, in some instances. The function seems to be to assist in supplying lubricant to the vocal cords. Under the term laryngocele ventricularis, Virchow described a condition which he found postmortem of elongation of the ventricle, considered by him to be a pathologic condition, running up as high as the upper border of the thyroid cartilage, or, in rare cases, as far as the hyoid bone. Anatomists today believe this condition represents simply an anatomic variation of a normal appendix of the ventricle.

The term laryngocele ventricularis seems a suitable one for the condition the speaker was discussing, where there exists a cystic dilatation of the appendix of the ventricle. This cystic dilatation is a very unusual condition. Hippel, in 1910, made a complete review of the subject, and collected, in all, twenty cases throughout the entire literature which he was able to verify as cystic dilatation of the ventricle of the larynx. Eight of these were discovered postmortem, so that there were only twelve cases that had been observed during life and recognized.

These cystic dilatations of the appendix of the ventricle form in three different ways. Sometimes there is simply a dilatation within the larynx, with laryngeal symptoms; at other times the cystic dilatation does not take place in the larynx at all, but the point of the appendix is pushed through the thyrohyoid membrane, forming an external dilatation, so that the only symptom is from the external swelling in the neck. In other cases, like the one he wished to report, there is a double condition—cystic dilatation external in the neck, and also dilatation in the larynx.

The causes leading to this condition are recognized as two: One, the existence of one of these elongated appendices. The elongated appendix of the ventricle is supposed to be necessary before the patient may develop a cystic enlargement. As the active cause, spells of coughing are thought to play a rôle. In the case reported by the speaker a violent fit of coughing apparently started the process. Blowing on a wind instrument has been responsible for a number of cases. In one case it seemed that the cystic enlargement of the ventricle was brought about by Politzeration of the middle ear.

Regarding the symptoms produced, they vary as to whether there is external or internal enlargement or a combination of the two. When external, it is very characteristic, located directly above the thyroid cartilage. It may be quite an enlargement. The enlargement in the neck is a very characteristic condition. It is hardly to be mistaken. It can be reduced by pressure, but this only lasts for a short time and then it enlarges again. The first symptom is usually pain around the region involved. When there is enlargement in the larynx, one gets just the symptoms you would expect—loss of voice, because one vocal cord is covered over by this enlargement, which stops its action, just as any growth in this region would do. If the swelling in the larynx gets large enough, it may produce symptoms of difficult respiration. The patient whose case was here reported had such symptoms at one time.

One of the most annoying features of this condition is the infection that sooner or later often gets into this cystic enlargement. During some acute infection in the throat this pouch becomes infected, and then it remains chronically infected, secreting large quantities of pus. In the case reported the constant secretion of foul pus into the throat, not only during the daytime, but also during the night, has been her chief annoyance. During childhood this patient had experienced a good many attacks of acute laryngitis, with symptoms of hoarseness and coughing, which would be associated with sore throat, lasting several weeks, and then disappearing. She had a great many such attacks, but they were of short duration. Then she had been practically free from symptoms for twenty years—that is, until four years ago this spring, when she was traveling abroad and had one such attack, apparently the same as those of early life. During a violent spell of coughing she felt a filling up of the neck, developed hoarseness of a marked degree, some pain in the side of the neck. This cystic enlargement never entirely disappeared, although at times it would collapse, and for a short time the voice would be restored. The loss of the voice was, of course, a hardship, but the pus was worse. It was not only annoying in the daytime, but it was still more troublesome at night, when she often was required to sit up most of the night in bed. The pus would fall into the larynx and she had to cough it up constantly.

The year after this cystic enlargement developed she was in Chicago and saw a number of men, and several attempts were made to relieve it. One man operated twice on the larynx itself, attempting to give her relief. Of course, this relief was only temporary. On opening the cyst it would collapse like a punctured balloon, but it would soon fill up again. She consulted a number of general surgeons, and one external operation was made, leaving a scar in the neck. In looking over the case it was quite apparent that any effort to operate in the larynx itself would probably only give a very temporary relief, because there was a big pouch in the neck which would continue to pour off pus into the throat just the same.

In talking the case over with Dr. Dean Lewis, it was thought best to try, first, to get rid of this pouch in the neck, which was done, and the relief following that operation was very marked. The amount of pus secreted was very much diminished, but not entirely eliminated. She was able before this operation, by pressing on the external enlargement, to express a quarter of a cupful of pus at one time. They did not attempt to split the larynx and remove the cyst in the larynx itself, feeling that the removal of this large pouch outside might give relief enough without running the risk of producing an injury to the voice. (Dr. Shambaugh exhibited a drawing which was made of the larynx before it was operated.) Later the speaker attempted to make a resection of the cyst in the larynx. It was quite clear that any instrument introduced from above to cut it open would cause a collapse, and he wanted if possible to split the whole cyst from top to bottom. To do this he had a special instrument made (which was exhibited), which he could introduce below the false cord into the ventricle, and then slit it up to the top. The operation was undertaken under cocain. After the splitting of the cyst the voice returned. Then with a Krause biting forceps he bit off piece after piece in front and behind, until he had an opening about the width of his forefinger. The operation lasted fully an hour, because every time a piece was cut out it began to bleed and he had to wait until the bleeding stopped. The result of that clearing out of the larynx has not been as satisfactory as he had hoped. The size of the cyst now is perhaps one-half or one-third what it was before the first operation. The remaining pouch has healed over so that there is just a little fistulous opening, which distends somewhat with pus. But the scar tissue has reduced the size a great deal. There is very little trouble now with the pus running into the throat at night, although it has been more during the last few days. A couple of weeks ago she had an acute sore throat, accompanied by a flareup in the throat symptoms, with chill and some fever.

DISCUSSION.

DR. DEAN D. LEWIS said that Larrey apparently was one of the first to report a laryngeal diverticulum. During the Egyptian campaign he found that several of the people who shouted the verses of the Koran from the minarets had peculiar elastic tumors in the neck at the side of the larynx. It is doubtful whether all these cases were diverticula. Some undoubtedly were vascular strumas. There was, however, a marked interference with the voice, for in many cases the people became so hoarse that they could no longer shout the verses, and they were then assigned the duty of tending the fish ponds in the temples.

After the army returned to France, Larrey noted two cases of laryngeal diverticula in the under officers of the guard.

The extralaryngeal diverticulum appears at the lower and posterior part of the submaxillary triangle. It passes through the thyrohyoid membrane over the upper border of the thyroid cartilage to reach this position. Some cases have been reported where the pouch appeared below, passing through the cricothyroid membrane, but it is doubtful whether these are instances of true diverticula.

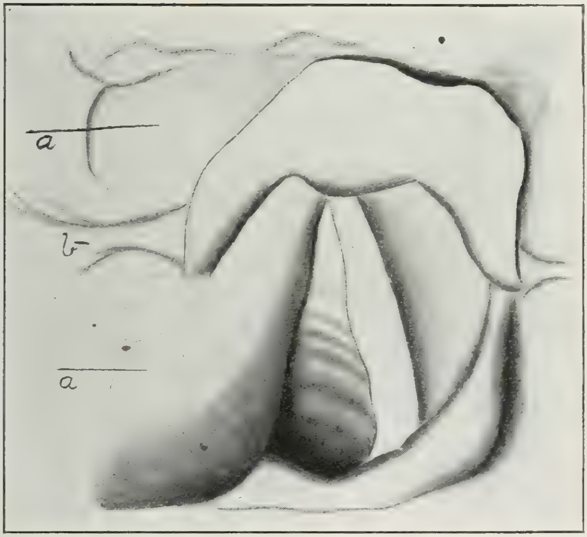
The diagnosis is not difficult, but the operative treatment offers many problems. The true extralaryngeal diverticulum can be removed easily. The intralaryngeal methods which have been employed in treating the intralaryngeal sac have not been satisfactory. Laryngofissure gives good exposure of an intralaryngeal sac, but the speaker believes that the best procedure is to split the thyroid cartilage just in front of the superior horn, and to expose the outer aspect of the arytenoepiglottidean fold and the sinus. In this way the mucous lining of the diverticulum and the remainder of its wall can be removed without opening, at least to any extent, the cavity of the larynx.

DR. OTTO T. FREER said that the patient exhibited by Dr. Shambaugh and operated by Dr. Lewis was formerly his, and he was the first one to make a diagnosis of her ailment when, what later became a pus sac, was still an air sac. He also had to encounter baffling difficulties in the treatment of this rarest of affections, difficulties which finally pointed out to him an operative method which promised success, when the patient decided to leave his care, so that he could not do what he wanted to do.

At a meeting of laryngologists last winter, at which Dr. Joseph Beck, Dr. Chas. M. Robertson, Dr. Stanton Friedberg, and Dr. Norval Pierce were present, Dr. Shambaugh had questioned Dr. Freer concerning his experience with the patient, who had then come into Dr. Shambaugh's hands. Dr. Shambaugh told him that he was considering a partial laryngectomy for the relief of the condition. Dr. Freer then fully described to Dr. Shambaugh the anatomic relations of the air sac, and told him that as the patient had a perfect larynx and her difficult breathing and loss of voice were due to the mere resting of a mucous membrane sac as a damper upon one cord, even laryngotomy, not to speak of the formidable operation of removing a part of the laryngeal skeleton by hemilaryngectomy, would, in his opinion, be the wrong procedure, especially as it would not give the desired access to the extensive diverticulum, and would spoil the patient's potentially fine voice. Dr. Freer then suggested, instead, the line of operation which he was pleased to see had been followed by Dr. Shambaugh and Dr. Lewis.

The following is the remarkable history of the patient while under his care. The appended drawing was sketched from life, with all possible exactness. The patient was referred to the speaker by Dr. C. Gurnee Fellows for diagnosis, February 7, 1911. Her age then was sixty-six. She stated that she had been subject to repeated attacks of peritonsillar abscess, the last one in 1893. Her present trouble began in November, 1910, with a feeling of obstruction in the throat, and hoarseness, which did not change.

Examination.—On the left side a smooth, deep-seated, elastic swelling distended the pharyngoepiglottic and aryepiglottic folds, extending to the thyroid cartilage externally, and so effacing the fossa pyriformis. It also filled the left vallecula to the base of the tongue. It covered the left vocal cord, whose border could be seen white and normal, when the swelling was pushed away from it with the laryngeal probe. The portion of the swelling resting upon the vocal cord acted as a damper and made the voice very hoarse. Regarding the tumor as a cyst, Dr. Freer punctured it diagnostically in its posterior part with the laryngeal knife, when, to his surprise, the tumor instantly vanished and he looked into a normal larynx, the patient at once speaking in a clear, natural voice. It was evident that the sac had been filled with air and not fluid. A probe descended through the cut to a depth of two and one-quarter inches, passing downward and outward between the thyroid and cricoid cartilages. In a few days the opening had closed and the tumor had refilled with air. The speaker recognized that he had to do with a diverticulum of the ventricle of the larynx of great extent, forming with the integument a triple layer of mucosa over the left arytenoid cartilage, the left aryepiglottic fold, pharyngoepiglottic fold and fossa pyriformis, creating in effect, when empty, an enormous mucous bursa over these parts. There was no evidence at this time of an extension of the sac outside of the thyrohyoid membrane.



Dr. Freer's drawing of diverticulum of the ventricle of the larynx, made in 1911. a, a, The diverticulum distended with air. b, Pharyngoepiglottic fold.

On March 13, 1911, he reopened the sac in front of the left pharyngoepiglottic fold in the vallecula, his intention being to create a permanent opening, however small, to permit the escape of air from the sac, for its accumulation was evidently due to a valve action in the outlet of the ventricle of the larynx, which permitted air to enter the sac, but let none come out. As before, the sac collapsed, and from this opening he could pass a probe from the vallecula down through the ventricle and out into the trachea below, and could see into an extensive mucous membrane pocket. In spite of enlarging the opening with the Heryng punch and the galvanocautery, it closed again in a few days, and the sac refilled as before. At this time he saw the patient with Dr. J. Gordon Wilson, and they agreed that laryngotomy was unwarranted, as it would injure the potentially fine voice, and could not lead to extirpation of the extensive sac. The indication was to prevent the confinement of air in the sac, and they decided that the best way to accomplish this was to split the sac from top to bottom, cutting through the ventricular band, the aryepiglottic and pharyngoepiglottic folds. This would divide branches or the trunk of the superior laryngeal artery which crosses the fossa pyriformis to the larynx and epiglottis, but a previous tracheotomy would permit tamponade. However, the patient wished no further operating at this time, and the speaker did not see her again until May 6, 1912. Conditions had remained the same until October 13, 1911, when she had another peritonsillar abscess in the left tonsil, which nearly suffocated her until it burst. Dr. Charles C. O'Byrne attended her, performing tracheotomy, and opening a swelling in the neck which obviously connected with the internal sac, and which was full of pus. The suffocative symptoms demanded the tracheotomy. Before he operated, however, the pus had reopened the old opening made in the vallecula and kept escaping at the base of the tongue. When Dr. Freer saw her in May, 1912, after this occurrence, he had for the first time evidence of an extension of the sac into the neck, as the patient could force pus out of the opening in the vallecula by pressing on a swelling over the left half of the hyoid bone. Air entered and left the opening with a squeak, which greatly annoyed the patient. At this time he advised her to let him extirpate the sac in the neck and do the internal operation which Dr. Wilson and he had decided upon as the best thing to do; but she again left his care, and he had not seen her since.

It is his opinion that the cause of the suppuration of the sac in October, 1911, was bursting into it of the peritonsillar abscess, and he thought that but for this the diverticulum would still have remained an air sac. But for the suppuration its extension into the neck would have remained unnoticed, and Dr. Shambaugh is mistaken in saying that the diverticulum in its air sac stage formed a swelling in the neck—this part of the sac was not filled with air.

In conclusion, he wished to refer to the remarkable article of Dr. J. Gordon Wilson, presented in the Chicago Oto-Laryngological Society some years ago, in which he showed the connection between laryngeal diverticula in man, and the air sacs of the roaring monkeys, specimens of the monkey's larynges with the distended ventricular sacs being shown.

Dr. Shambaugh, in closing the discussion, stated that he regrets that he is not able to acknowledge having received any suggestions from Dr. Freer regarding the treatment which was of any assistance in the handling of this case. It is hardly necessary to point out that Dr. Freer has confused the term laryngectomy with laryngofissure. Neither Dr. Lewis nor Dr. Shambaugh at any time had contemplated a laryngectomy, but had considered doing a laryngofissure. The failure to get a more satisfactory result in the work done was because during the removal of the sac they had stopped short of doing a laryngofissure. This part of the work was planned and carried out by Dr. Lewis, who did not even know that the case had seen Dr. Freer two years ago, or that Dr. Freer had offered suggestions regarding treatment.

Dr. Freer said that Dr. Beck heard him make the suggestions.

Dr. Lewis, in closing, said that he thought the only thing that ever cured cases of laryngeal diverticula was laryngofissure. He exposed the sac by the external operation, and thought that by splitting the cartilage and everting it the fissure would fill up again, but it did not. The whole operation could be done by splitting the cartilage laterally, because the thyrohyoid membrane is exposed. The external sac is exposed, and the work can be done from the outside.

Complete Laryngeal Stenosis Operated on by Laryngofissure and Laryngostomy.

Dr. Joseph C. Beck exhibited a baby, one and one-half years old, with the history that the baby fell over a bureau drawer and struck its larynx. The child was then taken to a doctor, because of difficulty in breathing, who said that the child must have swallowed or inhaled some foreign body. The patient was then sent to a hospital, where an X-ray picture was taken, which it was thought showed a foreign body, and operation was advised and performed, but no foreign body recovered, and so search for it was abandoned. Following this a tracheotomy was necessary, and the tube had to be retained. If the tracheotomy tube was removed at any time, it led to a choking sensation. Then the child was sent to a general surgeon for examination, and he found nothing to explain the condition, and inserted a larger tracheotomy tube. When the speaker first examined the case he found that the ligament that supported the epiglottis must have been separated, because the epiglottis seemed to be lying over on one side. On looking between the cords he found a complete blocking below that point. He decided to operate by laryngofissure. Chloroform was used as an anesthetic, as ether had been previously used very unsatisfactorily. He took the anesthetic very badly—in fact, collapsed, and was practically dead on the table. Artificial respiration being resorted to without any response, the operator placed his mouth to the tracheal fistula and inflated, causing breathing to return normally. Then a laryngofissure was performed, resecting the scar tissue within the larynx and trachea, and a laryngostomy tube inserted—the up and down tube of Jackson, which has served the speaker very well in all his cases. This laryngostomy tube was left in for ten days, being covered in addition with a rubber tube. The tube has now been out about ten days, and the child at the present time is able to breathe through the mouth without any difficulty; the external opening is practically closed. There are a number of scars on the neck, and Dr. Beck is going to do a subsequent plastic operation on the child. The child has no voice, and has not uttered a sound. In most of these laryngostomy cases it is necessary to do a plastic operation subsequently to close the external opening, but in this case it will not be necessary.

The second case was that of a man, first seen three years previously. He came to the hospital with symptoms of marked suffocation, requiring immediate tracheotomy. At first it was thought to be due to carcinoma, but removal of a piece of tissue showed on examination that it was of a different nature, proving to be a marked case of syphilis. It was impossible to introduce anything through the larynx at any time, and after a tracheotomy tube was worn for some time the larynx was split. After he was treated sufficiently for the syphilis so that a negative Wassermann was obtained, the larynx, however, remaining absolutely obstructed, the speaker operated, doing a laryngostomy. The laryngofissure had to be done with bone forceps because the thyroid cartilage was ossified (shown subsequently by microscope), introducing a very large up and down tube, which was left in place for two months. It is necessary in these cases to retain the tube for a long time, packing on top of it, in order that the thyroid cartilage remains open. Later the wound is closed by laryngoplastic. The method used for closing the larynx after the cartilage remained open was illustrated by the speaker on the blackboard. The patient breathes perfectly normal, and has a hoarse voice, but a fair one.

The third case was one of a man who had a chronic suppurative ethmoiditis that caused secondary perichondritis of the larynx, making the breathing impossible. It was impossible to get anything through except a very small probe. Immediate tracheotomy was necessary. Incisions within the larynx and dilatation were tried, but were not successful, so the speaker decided to do a laryngofissure and subsequently laryngostomy. At operation a very large stricture was found in the trachea, close to the substernal notch, a stricture that would not permit the passage of a small pencil. The whole interior of the larynx and trachea, for that matter, was filled out with a mass (of which the speaker showed specimens) of hypertrophic mucous membrane. The epithelium was enormously thickened, as was the epithelial tissue. He proceeded in a similar manner as in the other two cases, putting in an up and down tube, packing on top of it, and finally succeeding in keeping the larynx and trachea open. Then he wished to close this external opening with some solid structure, instead of skin, fearing retraction. He thought he would transplant a rib as a support, and, therefore, put a piece of rib into the subcutaneous tissue in the neck in close proximity to the opening, planning later to make a flap including the healed-in rib, but there is where Dr. Beck made his first mistake. He simply made a flap with the rib in it, turned it over and sewed it into the gap of the thyroid cartilage, thus closing the wound, but he failed to cover the granulating surface at once with skin from the other side. This piece of rib was lost, and that first operation was a failure. Then he decided to try the Kusch operation of transplanting a toe to the hand and then the neck. However, the patient was frightened one night during sleep, shifted his position within the cast, and severed toe and hand. This operation was also a failure. Dr. Beck intended to implant another solid body, namely, transplanting the clavicle, using the Manley method. (Since presenting the case, this last mentioned operation was performed with success, and about two months later the final closure of a little slit was made by employing the neighboring skin. The patient has only three fingers on one hand, and that is the reason why Dr. Beck did not employ the finger method of closing the larynx defect. The result is fair breathing and a fair voice. It will be necessary, however, to employ dilatation to enlarge and keep up the breathing space. Dr. Beck has done this on the patient several times by the suspension method. He wished to call attention to the introduction of an intubation tube by suspension, which is very easy of performance.

DISCUSSION.

Dr. Otto T. Freer suggested the method of taking a fine dental circular saw with a dental handpiece for the purpose of entering these hard places of blocked-up larynx. He referred to a case of a larynx of this sort in a case of carcinoma, where he did a laryngostomy. With this saw it is possible to make a fine line, without any other violence, such as the bone forceps naturally implies.

Dr. J. Holinger said that in 1898 or 1900 he saw a patient with fracture of the larynx. The man was a plumber's helper, and in carrying a cast iron sink up a steep incline fell and struck with his neck on the edge of the sink. He lost his voice at once, and had difficulty in breathing. He came to the speaker the next day. The larynx appeared compressed from the front backward against the vertebral column. The lower part of the phraynx was normal. Apparently only the vocal cords were injured. They were immovable, red and swollen. The hyoid bone was not fractured. Dr. Holinger compressed the larynx from both sides, whereupon, with distinct crepitus, it took its normal form. When he looked at it again it was evident that the fragments had adapted themselves very nicely. Nothing else was done, and after about five weeks the voice came back and the patient made a complete recovery.

Dr. Holinger asked Dr. Beck how he thought the fracture of the hyoid took place; which part was fractured, and what was the displacement of the pieces. Furthermore, he would like to know what the conditions are at the present time—are the fragments movable; are they united, and are they in anything like normal position?

Dr. Beck, in closing, said that he did not see the baby at any time during the accident. It is now about eight months since the accident occurred. He found the hyoid bone intact, and everything all right. The trauma occurred below the cords; the cords themselves were all right. When he opened the larynx he found this mass of connective tissue subglottic. He did not think that the operator who looked for the foreign body went in the larynx at all. The cords are all right, and the child will have a good voice when it learns to speak.

Radical Mastoid.

Dr. Charles M. Robertson said that simple mastoiditis is caused by lack of drainage in the drum membrane. The general surgeon thinks he can do a mastoid as well as a specialist, and for that reason he spoke more particularly to the general surgeon. We say, then, that a mastoid is a sequel of a suppuration of the middle ear. Nearly all suppurations of the middle ear, where the discharge is profuse, are due to mastoiditis. This suppuration extends at least into the antrum cell of the mastoid, and perhaps to the terminal cells.

In small children, the openings on the surface of the bone allow a great deal of pus to escape into the subperiosteal space, and in these cases the mastoiditis becomes a subperiosteal abscess. The old method of treating such cases was to cut down by the Knight incision, to allow pus to escape, and the operation was then supposed to be completed, and was known as the simple mastoid operation. That is no operation at all, and has nothing to do with the mastoid. If these cases were allowed to go on, the pus would probably break through.

The mastoid operation, as he has seen it performed by the general surgeon, consists in boring a hole into the mastoid and letting it go at that.

As we understand the simple mastoid operation, it is an elimination of all of the cells, whether they be deep or superficial. There are two types—one, conserving the mastoid antrum, and the other, sacrificing it. In acute cases of mastoiditis some of us have an idea of saving the antrum cell of the mastoid, for the reason that the case heals better, and we have, as a result, a middle ear that is added to by the antrum cell. In the old operation, however, the antrum cell is destroyed. This is supposed to give a better middle ear, but whether or not that is going to take the shape of a policy that will be proper or not, the speaker did not know.

There is another mastoid operation, called the antromeatal operation, in which the simple mastoid is done, and after that is completed the posterior wall of the external auditory canal is cut away down to within three or four millimeters of the aditus tympanicus, and the meatal flap is pushed back through the wound, and the cavity treated through the meatus instead of by the wound opening behind, which is done in the simple operation.

In the radical or complete operation the mastoid cells are completely exenterated. The bone is cut down over the attic. The attic, the aditus ad antrum and the external auditory canal and mastoid cells are all drawn into one cavity and the eustachian tube destroyed. Very many radical operations are made on cases that exhibit chronic discharge, and these chronic discharges should be differentiated before an operation is made. There are very many cases of chronic discharge of the middle ear in which the discharge does not come from the antrum or the mastoid cells. Many of these cases are now operated on by the radical method, when they should not be operated at all. They are cases of weeping eustachian tubes.

The speaker did not go into the indications of the different forms of operations, only that we say in the simple mastoid operation we drain the cavity of the mastoid cells for a lack of drainage, which lack of drainage produces temperature and other symptoms, and in severe cases indications of brain complications, such as sinus thrombosis or meningitis or extradural abscess. The meatal mastoid operation is used when we desire to produce a very fine cosmetic effect, but is contraindicated in all cases of tuberculosis and syphilis, and in cases where there are cholesteatomatous masses.

Preservation of hearing is the main feature in doing the simple and antromeatal operation, while after the radical mastoid operation the hearing is usually not so good as before. One reason for this is because the middle ear is obliterated, the ossicles are gone, the drum membrane is destroyed, the eustachian tube is closed, and the ear is covered with an epithelial lining rather than mucous membrane, and on account of this the oval window does not transmit the sound as it should, owing to the inelasticity of the skin covering the oval window.

The speaker next called attention to certain markings on the outside of the mastoid process of the temporal bone, which are not mentioned in books, one in particular, the lamina cribrosa, which he always observed gives a lot of assistance in marking out the line for operation by denoting the depth of cells over the sinus. (Dr. Robertson then illustrated the steps of the operation on the blackboard.)

The method he has adopted in operating on cases of mastoiditis, which makes the work very simple, is as follows: First, he determines the line of incision; the top of the opening in the cortex is on a level with the top of the meatus, and is three or four millimeters behind the meatal orifice. The original opening is a round hole, and he goes down immediately, so that at a depth of one and a half centimeters he is directly in from the spine of Henle. He then enters the antral cell. Then the external cortex is removed throughout. Next he chisels out the tip cells of the mastoid, paying no attention to the tissue between this and the antrum cell until the mastoid tip is entirely clean. Thus there are two holes, one in the tip and one in the antrum, and the lateral sinus lies between, covered by cells. After exposing the lateral sinus wall, the posterior angular cells are taken out. After that the simple mastoid operation is completed, and then we come to the second step, which is cutting down the bridge. So many operators have so many different ways, all just as good as the one employed by the speaker, but he thinks this is the simplest one. (Indicating on blackboard.) After this he pays no more attention to the mastoid cavity. He makes a cut directly on a level with the floor of the cranial cavity, coming forward as far as the anterior border of the meatus. Care must be taken not to come too far forward, for fear of opening the glenoid fossa. In cases where the external convolution of the brain dips down, the floor of the brain can be followed until reaching the level of the second convolution. On approaching the middle ear, care is taken not to get any of the posterior wall of the external auditory canal at all. He cuts clear through on the superior wall into the middle ear. After that he has no trouble about the facial nerve, because it does not come above this point. He has no trouble with the semicircular canals, because he knows that they are at least below the upper third or three-fourths of the posterior wall. Then the wall is cut through and the whole ear is exposed. He trims down the posterior wall to the floor of the aditus ad antrum, which finishes that part of the operation. He then destroys the eustachian tube as far down as the isthmus. The eustachian tube belongs to the middle ear as far as the isthmus, and from there down it belongs to the throat. He is very careful in cleaning out the eustachian tube, because he realizes that there is but a thin sheet of bone between that and the internal carotid artery.

Many people do not understand exactly where to find the canal for the tensor tympani muscle. It comes in from the middle ear and extends across just above the oval window. The facial nerve lies just exactly above the tensor tympani muscle. The tensor tympani muscle lies exactly in front of the oval window.

After the whole cavity is thrown into one, the cutaneous canal of the ear is cut, either reflecting one flap up or one down; or, as he generally does, the flap is lifted up into the roof of the cavity by cutting around the conchomeatal margin and splitting the membranous canal on the lowest line. This is practically the entire operation.

If one desires to expose the cerebrum, it may be done from above. If one wishes to expose the lateral sinus, all that is necessary is to chip off the wall here (indicating), remembering that as you come down on the lateral sinus the facial nerve lies just about a millimeter above it on the posterior wall of the meatus.

In curetting the middle ear we must remember that the facial nerve lies just a millimeter above the oval window, and therefore great care must be taken, because even rough handling of the facial nerve canal is apt to cause grave results.

DISCUSSION.

DR. NORVAL H. PIERCE said that in 1873 Schwartze published his first communication on the treatment of mastoid inflammation; previous to that time there was a strong feeling among otologists and general surgeons against the surgical opening of the mastoid for any purpose. But, based on von Tröltsch's dissections and his own of mastoids, he concluded that it was a safe procedure, and in 1873 published his first communication. From 1875 to 1882 he published the results of a number of cases. He treated both chronic and acute suppurations in the same way. His procedure was simply to do what is now termed the simple mastoid, cutting down and elevating the periosteum and chiseling a hole in the mastoid antrum. In acute cases the results were very favorable, and in chronic cases they were very unfavorable. Most of the cases died of cerebral complications or septicemia. His method of keeping the wound open was varied, but he at last concluded that a lead nail was the best way. This lead nail was introduced into the antrum and kept in place by a steel band that went around the head. Of course, irrigations with various solutions were used, and the matter remained in that condition until Küster published his paper in 1889, in the *Deutsche medicinische Wochenschrift.* His method of treating the mastoid was a part of a general surgical proposition. He endeavored in this paper to establish a method for treating suppurating cavities with noncollapsible walls, such as the mastoid, antrum of Highmore and the pleural cavity. As regards the mastoid, he divided suppurations of the ear into two classes: First, those cases in which the antrum alone was involved, and, second, those in which the antrum and the cavum tympani were involved. In the first class, he operated by the Schwartze method, except that he took away the entire mastoid covering, his proposition being that no overhanging wall should be allowed to remain in these operations, and that the cavity should be obliterated. In the second class of cases, in which the cavum tympani was involved, he took away the external auditory canal down to the cavum. In certain other cases, where he could demonstrate that the contents of the cavum were diseased and necrosis of the ossicles existed, he removed these and extended a drain from the postauricular external opening through into the cavum, and out into the external auditory canal. Von Bergmann went a little further, and not only took away the external auditory canal—the posterior portion—but also the superior portion of the canal. Then Stacke came along with his flap, which really completed the development of operations on the mastoid as they are found today. All other operations have been modifications of these original ideas.

Regarding the operation on the mastoid in acute suppurations and preservation of what has been called the antral box, the speaker thought this was very important, and he is more and more of that opinion as his experience enlarges, and believes that this fact should not be lost sight of. If we scrape away, or chisel away, or remove in any way the entire three walls of the antrum, we are going to get an overgrowth of mucous membrane from the cavum tympani, which will permanently form a large cavity, lined with very poorly nourished mucoperiosteum, which will be the seat of inflammation every time that the cavum tympani is infected. This is the cause of the breaking down of the mastoid wound which is seen very frequently in children, because this mucoperiosteum has prevented the closure of the wound by the formation of osseous tissue. The speaker could say positively, from his experience, that there was nothing gained by scraping away the walls of the mastoid. Most men held the opinion that the suppuration and softening of the bone took place through the lateral wall of the antrum towards the surface. This is not so. The softening invariably takes place in the floor of the antrum because, as is known, all the mastoid cells, either indirectly or directly, communicate with the antrum; and it is the blocking of these little tubes which communicate with the cells that produces the backing up of the pus in the pneumatic spaces, and it is the softening of the bone about these tubes which first causes the antrum to break down at the bottom. Almost invariably you will find a fistula which runs downward from the floor of the antrum back of the hard bone of the external auditory canal to the terminal cells of the mastoid. If one is very careful to go from below in dissections, he can find this fistula and get up into the antrum with a probe. When one gets into the antrum in this way, he takes away all the softened bone, wherever it may be, and the posterior cells, referred to by the essayist. Clean away the softened bone everywhere, if you like, but leave the box of the antrum alone, and when the removal of the pathologic tissue is completed put a drainage tube of the smallest size into the preformed antral perforation, and then pack the rest of the osseus wound with gauze. The soft parts are sewed up, except a portion at the lower angle, for the admission of the tube and the gauze. The question might be asked: Why introduce the tube? Is not the hole in the antrum sufficient? The tube, however, serves a very good purpose. After the third or fourth day, without unpacking the mastoid wound, it is possible to syringe out the cavum through this tube, and the fluid either goes through the eustachian tube or comes out through both the eustachian tube and the perforation in the tympanic membrane. In the majority of cases only one washing is required, and then the cavum tympani is found to be dry. The very moment it is found dry the tube is removed, and on the fifth or sixth day the dressing is removed, and the result is that in from one week to three there is complete cure. That is quite an advantage over the old method of operating, and the wound back of the ear is not so unsightly as the old wound, where it was packed open and the soft parts made to fill up the cavity within the mastoid.

The main idea in the speaker's mind was when to perform the radical mastoid, and when not. The general broad proposition is that a radical mastoid should be performed when there is evidence of destruction of the bone within the mastoid in chronic cases, and this is sometimes very difficult to ascertain. Perhaps the best way is to centrifuge the pus that comes from the ear, and if well recognized bone chips are found, then the indication is already present, because we know that the bone is being destroyed, and it is for the purpose of preventing complications such as softening or necrosis up into the brain, the middle or posterior fossa, or the sigmoid sinus, that operation is performed.

As regards the preservation of the middle ear, which has been advocated by Heath, in the majority of chronic suppurations there is necrosis of the ossicles, especially of the incus, and in a certain number of other cases necrosis of the tegmen tympani or of the promontory, so that Dr. Pierce does not believe, when a case has resisted all manner of ordinary treatment, and a radical operation has been decided on, that it is worth while to consider the preservation of the sound-conducting apparatus, because in these cases the adhesions, dislocations, etc., which form between the malleus, incus, stapes, and promontory, are so great that the hearing is very much reduced in the majority of cases. The advantages of the radical mastoid are far beyond those of any other method of operating, and while it may not benefit or increase the audition, it will not diminish it.

Dr. Otis H. Maclay asked Dr. Robertson, in closing, to mention the technic he employs somewhat more in detail, as it would be of interest to all the members present. The point is, Is it advisable to do much with the bur, or not? Some operators advocate doing practically all the work with a bur.

Dr. M. L. Harris said that in a great many of these cases of mastoiditis, where the trouble was beyond the ear, he has had to go ahead and take out the attic and also operate on the sinus a number of times. When these cases get beyond the specialist they come to the general surgeon.

Dr. J. Holinger said that the radical operation is undoubtedly mutilating. In children, conservative operations will often result in well functionating ears, under conditions where in grown people radical operation would have been indicated. This point was well taken a few years ago by Dr. Crockett, of Boston, and emphasized by Dr. Pierce in the discussion of the evening.

As to treating the sinus, he thought it should be laid bare very extensively, but otherwise left alone. Take away the surrounding bone and eliminate all possibility of retention, but do not touch the sinus itself, because very often there are thrombi which at operation are detached and carried in the lungs. The results of this method are good. He has operated this way for at least twenty years.

He did not think that the difficulties of the radical operation have been sufficiently emphasized. The difficulty in old cholesteatoma is not the great number of cells, but the scarcity of cells. There are usually hardly and cells, and the few are small and difficult to detect. The bone is thick and eburnated, hard. The antrum is not larger than a bean. If there is any gathering of pus in such a case, there is no possibility of drainage. The direction of least resistance is toward the internal ear. He has never encountered any difficulty in finding the antrum, no matter how small it was, by simply following the external canal, then the aditus ad antrum to the antrum. The lateral wall of the aditus an antrum is always difficult to remove. We must ascertain whether or not the incus is present. He has for this purpose a fine hook probe, which allows him to feel through the remnant of the external canal the aditus ad antrum, and by means of this probe he can always find the bridge, even before he is really down at it.

Another point: In making the flap, one must take away the ridge of the external canal to the very bottom. In this procedure the greatest number of injuries to the facial nerve occur. If a part of the posterior wall of the canal is left, it forms afterwards a ridge in the cavity which is always sensitive and often granulating.

The aim of the operation is to create one cavity lined with epidermis; all the excavations and niches must be eliminated.

Coming back once more to the after-treatment of mastoid operations in acute cases: The antrum and cells are supposed to be a reserve reservoir for air in the middle ear. If we wish to advance this function, it is well to inflate air gently by Politzer's method, as soon as the bone wound has been filled with granulations. Stress must be laid on the word "gently." The air must not be forced through the granulations. This will often benefit the hearing and avoid retraction of the drum membrane and adhesions in the middle ear, which may mar an otherwise perfect result.

Dr. Pierce asked Dr. Holinger whether he never opens the sinus in cases of thrombosis of the sinus.

Dr. Holinger said he never opens the sinus at all. He lays it bare very extensively. The less we work with the sinus, the less chance we have of retrograding advancement of the thrombosis towards the other sinuses at the base of the brain, and of loosening thrombus masses which may lead to embolisms in the lungs.

Dr. Robertson, in closing, said that the following were indications for a radical mastoid: Cases that had not healed from simple operation, and operations for preservation of the drum membrane, and all cases where the bones had lost their integrity should be operated by the radical method. Also cases with ropy discharge of clear fluid coming down from the attic, which is indicative of destruction of the bone tissue.

In those cases of acute suppuration, no matter whether the other cells are affected or not, the tip cell may be affected. If you wish to, it is very easy to destroy the cells of the mastoid, leaving the antrum cells, by attacking it from below.

He thinks that the catheter in the bottom of the antrum would be a good idea. He has never tried it, but will do so when he gets an opportunity.

He attacks thrombosis of the jugular artery and lateral sinus very differently from Dr. Holinger. He is afraid to leave a sinus with a plug in it. In all such cases it has been his practice to tie the jugular off below the plug, so that in the manipulations of the lateral sinus you prevent the sliding off of the thrombosis into the circulation below, and the veins entering the jugular below the bulb should be tied off, too. Then the sinus is fully exposed from the upper space down to the bulb, and the two extremities are closed by temporary plugs by the assistant, and the sinus slit in its entire extent. Then the assistant takes the pressure off the upper plug, and if there is no sinus thrombosis a free flow of blood follows. Then the lower plug is taken away to see if you get a flow from the jugular vein and superior and inferior petrosal sinus. If this is plugged the operation is extended into the neck, and the jugular is either taken out or destroyed by simply tying. Of course, we cannot take away the superior and inferior petrosal, but we can get most of the plug out.

There is usually quite a little swelling for a few days after operation, but after a little the collateral circulation takes care of it.

Dr. Maclay asks for more details in regard to the operation. In his operation he takes off the cortex with the straight chisel or gouge. After that he uses the bur. He has found, with the use of the bur, that it is desirable not to use it to the extent of making the tissues too smooth. If they are made too smooth, the granulation tissue does not take well, thus retarding the healing of the wound. All of the cells should be destroyed, leaving the bone a little rough.

Dr. Holinger said it was not necessary to do a radical operation on children. That depends upon the symptoms presented. If the child has necrosis of the bone, it does not make any difference whether he is twelve or fifty. It is the condition met and not the age that indicates or contraindicates operation.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

Regular Meeting, October 29, 1914.

DR. OTTO J. STEIN, THE PRESIDENT, IN THE CHAIR.

Carcinoma Localized Within the Larynx.

DR. OTTO J. STEIN presented a patient, a man, who was operated on about two weeks ago for a carcinoma, well localized on the right vocal cord, occupying the right anterior half, the anterior commissure, and a small portion of the left vocal cord; also slightly subglottically. This case was diagnosed by the usual method of taking out a piece by the endolaryngeal route, and followed in a couple of weeks by the laryngofissure. There was nothing unusual about the operation. However, there were a couple of points he wished to call attention to. First, he thinks that wherever it is possible to operate under a local anesthetic it is advisable to do so. He used the combined method in this case, as he has previously in a few cases similar to this one, by using ether for the introduction of the tracheotomy tube, and then immediately following with the rest of the operation by local anesthesia. In this case he resorted to a method never used before in operating by himself, namely, anesthetizing the larynx by injecting both the superior laryngeal nerves. This gave perfect anesthesia, so that he could work with absolutely no reflexes whatsoever during the entire operation, with the patient awake.

He also did another thing, which he had never done before, and which he thinks of advantage, namely, using an unusually high incision, away up to the hyoid bone, in this way avoiding the severing of the cricoid. That evidently has an advantage in the process of healing. It gave him all the access he wanted to the interior of the larynx, plenty of room without any trouble whatsoever, and it also gave a support afterwards which seems to have hastened healing remarkably. This patient has progressed so remarkably that one would hardly know any such operation had been performed. He has had no disturbances in any way. He is getting some voice back. There is a fibrous band forming, where the right cord was taken out, back to the vocal process, and over the anterior quarter of the left vocal cord.

Those were the two points he wanted particularly to make, working under this form of local anesthesia, injecting the superior laryngeal nerves with novocain, and preserving the continuity of the cricoid.

Dr. Charles M. Robertson asked Dr. Stein what the condition was that was present in the commissure.

Dr. Stein replied that there were granulations there. It was too early for any recurrence.

DISCUSSION.

Dr. J. R. Fletcher had had the pleasure of seeing the operation, and was very much delighted with the manner in which Dr. Stein had conducted the anesthesia. He thought it splendid. When he came into the room at the time of operation the patient had had the tube introduced, and thereafter made no manifestation of any consciousness of pain, or anything else, during the entire time of operation. He was conscious and lay there as quietly and serenely as though nothing were being done. There was almost no hemorrhage, and one could see the field of operation very well. It is an important point that the view of the operative field is not interfered with.

Dr. J. Gordon Wilson asked Dr. Stein what he injected.

Dr. Stein replied that he had asked for a one-half per cent novocain solution, but was told afterwards that he had been given and had used a one per cent novocain solution.

Dr. G. P. Marquis asked if there was any hemorrhage following the operation, to which Dr. Stein replied that there was a little.

Dr. Joseph C. Beck has had some experience with the method of injecting the superior laryngeal in operations upon not alone laryngofissure, but also the operation of laryngostomy in a healed-out syphilitic case, in which he did the complete operation of severing the larynx, removal of the tissues within the scar tissue, and the introduction of up and down tube, with absolutely no cough or reflex, whereas in other manipulations on this patient, thoroughly cocainizing the interior of the larynx, it had been practically impossible to do anything for him at all. He was very irritable. That method of anesthesia in larynx operations, he believes, is coming more and more into vogue, even in major operations, as laryngectomy. The combined anesthetic, however, he would call the injection of this blocking method, plus the general anesthesia, which has not the purpose only of making the patient insensitive, but further preventing the shock following the operation. He believes it is not only in the larynx that we should think about the nerve blocking, but also in operations on the nose and elsewhere in the region of operation. In other words, coming to the principle of Crile, of anociassociation. The book recently published by Crile on that subject is most interesting, and very valuable to men working in the department of laryngology.

In regard to the question of this procedure for carcinoma, he felt that question should be discussed, namely, as to the value of laryngofissure in carcinoma, as a cure for the disease.

He believes that when the diagnosis is made of a carcinoma within the larynx, the surgeon should be prepared to remove the larynx, because the splitting of it and the laryngofissure produce probably implantation and secondary carcinoma outside. We know that Semon, St. Clair Thomson, Ballenger, and others, have had wonderful successes with laryngofissure. The speaker has seen a few of these, and has also done a few. However, recurrence is very common in his practice of it.

DR. WILLIAM L. BALLENGER has also had some experience with this method of anesthesia. He had been in Crile's clinic, together with some of the other members of this society, and had seen him do his preliminary operation in total removal of the larynx. He does it under the blocking method. Since then the speaker has tried it a few times in laryngofissure and total removal of the larynx, and found it perfectly satisfactory, as it was in Dr. Stein's case. As to whether the operation for carcinoma of the larynx is successful or not, he has four cases living on whom he operated, one two years ago, and a few months ago this man was perfectly well. When he was in Seattle three years ago last September, he operated on a case, doing the operation of laryngofissure. This patient, a year ago, was reported as being perfectly well. Four years ago he performed a total removal of the larynx—not, however, using this method of anesthesia, but by general anesthesia. This patient is perfectly well. There was also another patient down the State on whom he operated three years ago. This patient is still living and apparently cured. So the question comes up, whether or not these operations are successful. The speaker is of the opinion that they are successful. A relatively good percentage of his patients are still living, three or more years after operation.

Dr. Charles M. Robertson has certain rules that he lays down in operating cases of this type, which are about as follows: There are four or six types of cases which we are called to treat. If the growth is absolutely intrinsic and does not affect the perichondrium, a laryngeal fissure is indicated. If the perichondrium is affected, the case calls for complete laryngectomy. If the glands outside of the larynx are affected, there is no use operating at all—the disease has already gone too far. The only thing to do in a case like this, unless we wish to experiment and see how long the case will last by operative interference, is to do a tracheotomy and let the patient be as comfortable as possible as long as he lives.

One carcinoma is different from another carcinoma, although the microscope may show the same findings in both cases. There is a lessened resistance that we have to take into consideration. Even that is questionable, because one case that will look as though the resistance is absolutely at par will go like wildfire; another case, in which the resistance looks nil, will last for an indefinite period of time. While in London this summer he saw a case of cancer of the top of the larynx, in which the upper part of the larynx, the epiglottis and tonsil were involved. While in the hospital this man was taken with erysipelas, and when he recovered the cancer was well. The speaker saw him after two years, and the throat looked normal. He also saw a case of sarcoma which was cured in a similar way. That would bring up the question of injecting these cases with the streptococcus serum, but so far as he has been able to learn this has not been very successful.

Dr. Beck asked Dr. Robertson if he meant Coley's serum.

Dr. Robertson replied that he did not mean Coley's serum; he meant simply a streptococcus serum. He does not think Coley's serum is good. He has not seen anyone who has any faith in it except Coley.

The matter of operating these patients under general anesthesia would be, in his opinion, very greatly assisted by the blocking off of the superior laryngeal, because the reflex in the larynx is absolutely intense, and cocain will hardly do even in the cases that are not very sensitive. In years gone by he has seen suggestion do away with reflex in the larynx, and that, with cocain, will sometimes do very well. You can relieve the reflex by suggestion, but you cannot relieve it with cocain.

He has several cases in town where he had done laryngeal fissure, and he is very much inclined to be in favor of laryngeal fissure, even as a preliminary step to complete laryngectomy, because in looking at the larynx from above you get a perspective, and cannot tell the extent of the growth. It may extend down the larynx to a considerable extent beyond the cord. It also is very prone to affect the esophageal wall, and where this is the case, his experience, and the reading he has done, would indicate that these cases are already beyond the scope of the surgeon. Where the epiglottis and the base of the tongue are already affected, the case is absolutely hopeless.

Regarding operation on these cases: In the type of case reported, for instance, Dr. Robertson always likes to follow the enucleation by the use of the actual cautery. He burns them with the Paquelin right to the cartilage. You might think there would be quite a lot of reaction from that type of treatment, but there is not. When he first commenced that method, he put in a tracheotomy tube for fear the patient would develop an edema of the epiglottis, but has never seen this occur. He, therefore, discontinued the use of the trachea tube.

Dr. Robertson has not had the wonderful experience that Dr. Ballenger said he has had. He has had cases live eighteen months, but that is the longest, after a total laryngectomy. The late stage of the cases may determine the longevity to a marked degree, as they are usually too far advanced at time of operation to promise good end results. His last case died of cerebral embolus the second day. He thought it was a very favorable case, and had expected to see the man get well. The more he sees of cancer—and he has seen considerable of it—the more helpless he thinks we are. Cancer, in his opinion, is a disease that is broader than the tumor. It is a disease that is absolutely in charge of the entire system before the stimulation of the cell commences, and when we operate on a cancer of the throat that is absolutely intrinsic, we may have resistance enough to overcome the condition of the blood, so that the disease will be alleviated or arrested, but it seems to him that when tissues commence to be stimulated and piled up, the case is already beyond hope.

Dr. William L. Ballenger said Dr. Robertson had very well outlined the hopelessness of these cases, but he wished to repeat what Dr. Crile told him. A patient called on him, and on examination he found involvement of the tongue, pharynx, larynx, glands—a very extensive involvement—and he, of course, believed the case hopeless. The patient would not hear of this, however, and insisted on operation. The operation was performed, consisting of removal of the tongue, the lateral and other walls of the pharynx, tonsils, glands and larynx, and Dr. Crile said the patient has been well several years. So, then, there are occasionally desperate cases that recover.

Dr. Robertson said that he did not mean that he has no hope at all in these cases, but it looks that way to him.

Report of a Bacillus Rarely Found in the Tonsil.

Dr. J. Gordon Wilson wished to record the finding in the palatine tonsil of the bacillus erogenes capsulatus (Welch). The tonsil was removed for frequent attacks of tonsillitis in a patient who had had frequent severe attacks of gastrointestinal disturbance and slight chronic articular rheumatism. The full report he will present at a future meeting of the society. The rarity of its reported occurrence in the tonsil (this is only the second case), and its frequency in the gastrointestinal canal, together with the marked symptoms which it is reported to occasion, justify its presence being noted.

Paper: The Operation of Choice in Maxillary Sinus Diseases.*

By George Paul Marquis, M. D.

Chicago.

DISCUSSION.

Dr. William L. Ballenger has had considerable experience with the Denker operation, as performed by Hajek at least, and also with the Canfield operation, with some modifications—probably an equal experience with each, and he must confess that the Denker operation, performed through the mouth, is superior to the Canfield procedure, in his experience. The Denker operation, as performed by Hajek, which is his model, is a work of perfection. He has never seen Denker do any work. He saw Hajek operate three or four cases three years ago, and with Hajek's lip retractors the field is absolutely open to inspection during the operation. It is just as though the antrum were taken outside of the face and inspected with perfect liberty. That, of course, is the great advantage of this operation. In the Canfield operation, while you can see the interior of the antrum remarkably well, it by no means compares with the view obtained by the Denker operation through the mouth.

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*See page 52.

With regard to the time of healing: He has never performed the typical Denker operation, using the nasal mucous membrane as a flap. He does not believe there is any advantage in it, because his cases certainly get well as quickly as those mentioned by Dr. Marquis, which were operated with the flap. Neither does he pack the antrum after operation—not even immediately following the operation. He does occasionally put in a very small wick for drainage, but not always, in either the Canfield or Denker operation. He does not believe there is any advantage in packing, but a great disadvantage. There is always the possibility of retention of secretions and subsequent reinfection.

He has not recently resorted to the mucous membrane flap in any of his sinus operations, and does not feel that his results justify him in attempting it now.

The point he wished to emphasize was that if the Hajek lip retractors are used, a remarkable view of the field will be obtained. In his opinion, the Denker operation without the flap, and, if desired, with it, is the operation of choice in chronic empyema of the antrum of Highmore. He does not believe, however, that it is best to remove the contents of the sinus in all cases—perhaps in none. He believes with Dr. Myles, of New York, that the antrum is too large a cavity to ever completely fill with granulation tissue. If you do a complete denudation of the sinus, it only partially fills, and there will be a suppurating surface left. He did not know if Dr. Marquis implied that there should be a complete denudation. Of course, the obviously diseased tissue should be removed. But one should always be careful to leave some periosteum in these cases, because we cannot hope to get complete filling in of so large a cavity by granulations, and in that case there is liable to be more or less discharge from that cavity for all time to come.

Dr. Joseph C. Beck, in view of what Dr. Ballenger said, namely, that he believes, with Dr. Myles, that the antrum cannot be obliterated, said that he thinks it can and does become obliterated, and that it is necessary in some cases to resort to that method of treatment when the intranasal method or the Denker operation is performed, and does not cure the case. It is not his fortune to cure these cases in three weeks. In the majority of them he finds that they suppurate for some time, and many of them do not get well unless he attempts to obliterate the cavity. The statements made about chronic suppuration were too broad, without mentioning something of the pathologic conditions present in the antrum. If it is a simple infection, no necrosis having taken place, then any simple method of treatment will suffice. But where necrosis and true granulations exist, such cases will continue to suppurate until that bone is healed. It is no different there than in the mastoid or any other cavity lined by mucous membrane and exposed to the external world. Therefore, he believes there are certain cases that the Denker operation, nor any other less radical operation, will not cure. He has had two cases in which he exposed the cavity obliterated on account of a neuritis secondary to the operation of obliteration, in which he found the cavity had entirely closed, the opening into the inferior meatus being only a small dimple. In the second case he did not operate, but inspected through the opening with the pharyngoscope, and it had filled up with granulations. In such cases it is necessary to remove a greater portion of the bone, in order to make the cavity, so to speak, collapse. You must go underneath the malar bone and remove the bony structure. In these operations he employs the electric bur, drilling all through the cavity, and shaving off the bony surface almost to the outside periosteum of the antrum, orbital as well as any other place. He realized the inconvenience from a secondary neuritis or neuroma of the inferior orbital nerve, but he has not seen any great difficulty with that, and it is easy enough to control, if there is any secondary pain, by injections of alcohol into the inferior orbital foramen.

Dr. Charles M. Robertson said Dr. Marquis had said that he thought perhaps in cutting the flaps as advocated by Dr. Robertson there would be difficulty in the curling up of the flaps. That is to a marked degree untrue. The mucous membrane and the perichondrial layer on the nasal side make a very thick flap, and it is a flap thick enough so that you can mould it to suit yourself. It comes to the technic in packing the antrum to hold the flap in place until it heals. That is rather a difficult thing to do, and requires a good deal of care, but if one is careful in putting the packing in (the speaker always dresses his cases) to get the flaps in place, they will stick.

Dr. Beck had raised a very good point regarding the pathologic condition that is present. In cases of infections of the mucous membrane, Dr. Robertson does not pretend to take cut the mucous membrane of the antrum any more than any other place in the nose. If there are polypoid degenerations, the polypoid degeneration is removed. He does not know just whose operation he performs, but he thinks it is the Caldwell-Luc rather than the Denker, although he does not follow either one, but a combination of both. However, he is particular about cutting away the antrum wall, destroying the anterior angle. The neuralgia, or lack of function of the superior dental nerve, of which Dr. Marquis spoke, occurs because he gets too close to the floor of the antrum and injures the superior dental in the bony canal. The superior dental nerve is very often slow in recovery, and very slight massage with a curette will sometimes injure it enough to disturb the function for some time. The lip neuralgia and lack of sensation are probably due to the stretching of the skin of the cheek during the operation, and will disappear after two or three months.

In regard to destroying the antrum by the method Dr. Beck spoke of, one must be careful in any cavity in allowing granulations to go on. We see that very often in the mastoid, where granulations are allowed to become rampant. The granulations adhere to each other and form cavities which will produce suppurative cavities. If anybody were to operate on any cavity in his body he would require him to superintend the granulation, allowing it to progress gradually rather than to go as it pleased. As a matter of fact, Dr. Beck said that the cavity was absolutely destroyed, and that there was only a dimple of an opening in the nasal wall. This shows that the antrum, if the mucous membrane is denuded, will close, and that is one reason why Dr. Robertson is particular about folding flaps into the antrum, so that he knows the opening will stay there forever. The Denker operation, in throwing the flap down on the floor of the nose, will allow an opening, but not as you leave it at the end of the operation. By the speaker's method the opening stays where he leaves it, because he has measured these openings five and six years after operation, and they are just where they were when the operation was completed. The matter of taking away bone would be the only way in which you could destroy a cavity like this; get the bone so that granulations come from bone tissue. When Dr. Brophy read a paper before this society last spring, it was stated that cavities in which the mucous membrane was removed healed over by epithelial tissue, and that epithelial tissue was prone to be very easily infected, because of lack of vitality. That is one reason why Dr. Robertson likes to leave mucous membrane in the antrum, which will close over the periosteum and meet the mucous membrane flaps that generate from the mouth of the opening, as he expects to leave them. It seems to him that the Denker operation, or the Caldwell-Luc-Denker, if you call it so, is the only operation, and it seems to him that in all of these cases, unless you just scratch out the antrum a little and leave all of the mucous membrane in place, they must necessarily be packed. If you just curette a little of the mucous membrane, there is not any particular idea in packing the nose, although, to him, it is absolutely essential that he put in dressing. He has never seen any after-effects from infection by reason of retained secretions. That is a reflection on the man who puts the packing in the nose. He drains rather than packs, and there is a great difference in the way dressings are placed in the cavity. He would expect his cases to go on and suppurate if he put a drainage wick in a cavity. He does not do it in the mastoid, and does not expect to put it in the antrum, although Dr. Ballenger has probably just as good results as he, and he practices that. He leaves the dressings in for four or five days, and that is the last he treats them, and they get well. The patient washes his own nose out. If these patients are not well in two or three weeks, he thinks there is something wrong in the technic. He would not say that these were the cases referred to by Dr. Beck—disease of the bone—but they are the cases Dr. Marquis spoke of, of infection of the mucous membrane; in other words, chronic cases.

Dr. Norval H. Pierce confessed to a sense of uncertainty as to the outcome of any given operation for empyema of the maxillary sinus, because he has had most extraordinary results from simple opening through the inferior meatus in cases that he believed were very severe, and he has had failures from the Caldwell-Luc or the Denker operations. Being somewhat at sea in this matter, he thought he would become experimental in a case on which he operated toward the end of last winter. It was a severe case with profuse purulent discharge from the nose, in a young girl in the early twenties. He took away the anterior wall and found the antrum entirely filled with polypoid tissue, so that he removed the entire mucosa of the antrum, and found sharp ridges of bone running about this cavity, so that it was divided into various little pockets. With a bur he took away all these ridges, so that at length he had a denuded bony cavity with a smooth surface. He did not open into the nose. He did not even enlarge the normal opening into the nose. He found with a probe that it was quite large. He did not pack the cavity. He sewed up the buccal incision over the bony wound, and the patient had scarcely any discharge from that antrum from the time of operation until he saw her last, perhaps six months afterwards. Dr. Andrews will probably say that this was a blood clot healing. There is no doubt but what that cavity did fill with a blood clot. What happened he has not the slightest idea of, except that perhaps it was a blood clot healing.

Dr. Corwin asked Dr. Pierce if transillumination was done, and what it showed.

Dr. Pierce said that there was always a shadow, both before and after operation, on that side.

He has had failures with every kind of operation. The majority of these cases get well—there is no doubt about that.

But the very cases you think are going to get well are the cases that do not get well. He has at the present time under his care a physician of prominence, and in this case he was very careful to do a thorough Caldwell-Luc operation, except that the nasal opening was in the middle meatus. He took away the diseased portion of the membrane, and left little islands which he thought on inspection were healthy mucosa. He did it under a local anesthetic. Everything went beautifully, but now, after a year, there is still mucopus coming from that man's antrum.

Dr. Beck brought out a very good point. The outcome depends largely on the pathologic condition of the maxillary antrum. If there is granulation tissue, there is also necrosis —superficial carries of the bone—and this should be carefully removed with either a bur or a curette. Personally, he believes that it is essential to be able to inspect the entire antral surface in these cases that resist the ordinary nonradical procedures. This is the essential in all radical operations. He does not believe the Caldwell-Luc, or the Denker, or any other operation will invariably cure an empyema of the maxillary sinus. A statement such as that is rather too sweeping.

Dr. J. Holinger, in the early part of the past summer, operated three antra according to Professor Denker's method, and since July five more. Before the beginning of last summer a number of cases had been operated upon, and had been under control over since. He had had the good fortune to assist Professor Denker in an operation in Boston, and does not deviate at all from the operation as he saw it at that time.

Regarding the pathology of the suppuration of the antrum: He considers it the advantage of the Denker operation that the whole cavity can be controlled; the pathology—whatever it is—can be seen and felt. The great variety of findings in the different cases has already been mentioned. Ridges, and even bony septa which close out parts of the antrum, are seen and removed. Necrosis of bone can be seen. Polypoid and even malignant degeneration of the lining may be recognized and properly dealt with.

As to the removal of the membrane by means of the curette, he has more than ever the impression that it is better to have even a polypoid, degenerated membrane than no membrane at all. He does not, and Denker does not, remove any of the lining of the antrum except from the floor, where the flap of the nose will cover the defect. The results, as he has seen them, have been universally good. Amongst the patients he operated in August, there was one who had been operated on the other side by a member of this society, with another method. Six weeks after the Denker operation he washed both cavities. The cavity that was operated by the other method still contained pus. The cavity operated by the Denker operation was absolutely clean, and did not contain any pus at all.

However, he had to confess to one failure, but that was satisfactorily explained. It was a very old syphilitic case, who did not have—as was shown afterwards—a suppuration of the antrum of Highmore alone, but of both antra of Highmore, and also of the ethmoidal and frontal sinus—that is, a pansinusitis. The other sinuses did not cause any clear symptoms, and became evident only after the operation. An X-ray picture showed the frontal sinuses absolutely normal, and later on the speaker could wash out a lot of pus from them. He wished to remind the members that syphilitic suppurations of these parts do not yield to iodid of potash and mercury, nor even to salvarsan. Dr. Louis Schmidt cautioned him not to use a strong antisyphilitic treatment in these cases, at which Dr. Holinger was surprised, but Dr. Schmidt insisted that such treatment often makes the suppuration worse, and such was the case. In this case all the cavities have been washed out every day—the antra, frontal and ethmoidal sinuses—which is a very tedious work, and the patient has improved remarkably in a very comparatively short time. That is, he has improved more in two weeks than during the two months previous.

In repetition, except for this syphilitic suppuration, all his cases have done very well, and he included amongst these cases with degeneration of the mucous membrane, with different kinds of septa, with necrosis, and all the pathologic changes that had been named. Denker always emphasizes the point of smoothing away from the floor the last remnant of the wall between the antrum and the nose; no ridge must be left, so that there is a perfectly smooth floor from the nose into the antrum. If there are difficulties in the after-treatment, you will sometimes find that this point has been overlooked.

Dr. George E. Shambaugh said that when this subject of the operations for the relief of chronic maxillary sinus empyema was discussed last year, he had called attention to the favorable results which he had seen in a number of chronic cases where the opening had been made through the middle meatus. In listening to Dr. Marquis' paper he had not noticed that any mention was made of this method of curing chronic empyema of the maxillary sinus. The speaker believes that an operation through the middle meatus could be more properly considered the operation of choice for the relief of empyema of the maxillary sinus than the radical Denker procedure, which should be reserved only for cases where the simpler operation fails to give satisfactory results. He has already had quite a series of these cases, and has been not a little surprised at the favorable results obtained. He does not believe that it is possible to tell positively before going into the maxillary sinus just what conditions will be found when the sinus is opened up. For this reason it does not seem logical to designate the most radical operation as the operation of choice for the relief of chronic empyema of this sinus, when the much simpler procedure will permanently cure many of them.

The operation is performed by taking off the anterior part of the middle turbinated body and then breaking through the nasal fontanelle into the maxillary sinus, and with suitable forceps making a large opening, one-half to three-fourths inch in diameter. The whole operation can be performed in a very few seconds under cocain. It seems that allowing the air to enter freely into the maxillary sinus is sufficient in itself to bring about a cure in many cases. In some cases where the discharge is persistent, it is possible for the patient to irrigate the sinus very successfully at home by the use of an ordinary eustachian catheter. The patient should be taught by tipping the head forward how to empty the sinus of all fluid after irrigation. The writer does not believe that the presence of polypoid degeneration of the mucous membrane of the antrum renders the case unsuitable for this method of treatment. There can be no doubt that extensive changes in the mucous membrane of the antrum return to a normal condition after allowing free ventilation through an opening in the middle meatus.

There is no objection to this method of operating that some of these cases do not get well with this simpler procedure.

Where a case still continues to have enough annoyance after this operation to warrant a more radical procedure, then one may go ahead with the Denker operation. Since the speaker has had the opportunity of seeing Professor Denker do his operation, he has been convinced that this is the best method for the relief of otherwise intractable empyema of the maxillary sinus.

Dr. A. H. Andrews was pleased to hear Dr. Ballenger say that he did not make the flap in breaking down the wall between the nose and sinus, and also to hear him say that he did not pack these cavities. If he had said that he did not wash them out afterwards he would have been still more pleased.

Dr. Ballenger said he had intended to say that. because he does not wash them out afterwards.

Dr. Andrews was also pleased with Dr. Shambaugh's position. Personally, he does not know of any way to tell before operating just what the conditions are in the antrum of Highmore. He does not know of any way to tell whether it is a chronic or subacute case. The history usually is not clear. The patient himself does not know when the trouble began, how long it has existed, or anything about it. They frequently do not know they have any trouble until examination for some obscure nasal trouble discloses pus in the antrum. He has followed the plan mentioned by Dr. Shambaugh almost invariably, unless the patient has come from a distance and must have something done that offers the best chance of ultimate recovery, and must have it done at once. He always goes in through the middle meatus, makes a considerable opening, cleanses the cavity with a current of compressed air, and sees how the condition gets along. Anyone who has not used that method will be surprised at the number of cases that will require no further operative treatment. Once in a while one will continue to discharge, and then, as said by Dr. Shambaugh, a more radical operation can be performed. The speaker is of the opinion that he treats his share of these cases of disease of the antrum of Highmore, and if his observation is worth anything at all, it is this: that they will get along far better if water is kept out of these cavities than if the douche is used. We have very sufficient and adequate means of cleansing the cavity by compressed air, and every drop of pus can be blown out. It is an easy procedure, and his patients have gotten along very much better since he has done that than when he used the douche method.

Dr. Shambaugh asked Dr. Andrews what he did about the home treatment when he used only compressed air to clean out these cavities.

Dr. Andrews replied that he did not have them use any home treatment. He has them come to the office two or three times a week, and that is all the treatment they get. With the method outlined, it makes no difference whether they are acute or subacute cases—the treatment is the same.

Dr. Shambaugh said that he considers it very important that the cavity should be thoroughly emptied of water after irrigation, as the water acts as an irritant in keeping up the empyema if allowed to remain in the sinus. The patient should be taught how to tip the head forward and to the opposite side, in order to assure the entire emptying of the sinus after irrigation.

Dr. A. M. Corwin thought something should be said in commendation of this excellent paper. Dr. Marquis had in a comprehensive and analytical way gone over those various operations, and that kind of a paper is of value and teaches all of us to think. He is inclined to agree very much with what Dr. Andrews had said. He used to irrigate all these cases, but latterly he has discarded that practice very largely. Occasionally he practices it in the office, but does not let the patient do it himself, except in isolated cases. He has observed that it is not mere irrigation, it is not mere drainage, that cures these cases, but it is ventilation; as shown by the fact that a good opening in the middle meatus will cure many cases, and the forcing in of the ordinary outside inaseptic air is an efficient aid.

The speaker agreed with Dr. Shambaugh in his remarks regarding the choice of operation. The more conservative method should be tried first, to be followed later by a more radical open operation, if necessary.

It does not seem to him that it is possible, through a large opening in the middle or inferior meatus, with a cannula, to blow every drop of pus out of such a cavity, as suggested by Dr. Andrews, but he does believe that the ventilation does act in a mysteriously beneficial way to help nature repair the damage done by infection of the closed cavity.

There is no one practicing this specialty who has not had unfavorable results, even by the most radical methods; and, on the other hand, even by the simplest method, either the Krause, or the method through the middle meatus, the most kindly results have been obtained, even in the most chronic cases, without the radical operation—either the Caldwell-Luc or Denker. But where the simpler intranasal operations are not sufficient, the Denker or modified Denker or Caldwell-Luc opeeation is needed to reveal the pathology.

DR. OTTO J. STEIN said that his experience has led him to feel now that he cares less and less to perform all of the radical operations mentioned. He feels that some of the minor operative measures of making large openings through the nose, either below or above the inferior turbinate, have saved many of his patients from a more radical procedure. He did not care to enter into the discussion of the choice of these various operations, however. That rests a good deal, as had been stated, upon the pathology and individuality of the operator, and probably the thoroughness with which the operation is performed.

DR. MARQUIS, closing the discussion, thought the members were pretty much agreed as to the general points that he tried to bring out in his paper. He thought, however, he had been a little bit misunderstood by Dr. Shambaugh and Dr. Andrews, when they spoke of trying the simpler operations first. Dr. Stein also, he feared, misunderstood him on this point. He did not intend to convey the opinion that every case of suppuration that came into his office, in his opinion, should have the Denker operation performed. Far from it. It is only in cases of last resort. He tries a simpler method first. A great majority of the cases will get well with simple washings, although Dr. Andrews does not believe in them. Dr. Marquis has seen a great many get well in that way. He does not care how the pus is removed, either by washing or compressed air, a great majority will get well if the pus is gotten out and drainage established. It is the rarest exception that we have to perform a radical operation, but the object of the paper was to bring out in those cases, where the simpler method did not suffice, the radical operation of preference. These patients, when radical operation is required, should be given the benefit of that one which will give them the greatest probability of a cure, and allows the operator to control the field of operation, under supervision.

Dr. Pierce has thought that the Luc-Caldwell gives a better field of operation because it takes away the anterior wall, while the Denker only takes away the nasal wall and the opening around the pyriform aperture. The very object of the Denker operation is that you can carry that opening just as far as you want, clear back to the molar teeth, if necessary. You can take the entire anterior wall off, if you want, and get an opening which brings it out in front of you. We all know that we have had trouble in these cases that do not get well because of some little focus in the anterior angle, and that is bound to stay in a Luc-Caldwell operation. But in the Denker operation there is no question but that you have every part of it under observation.

As to the question of removal of the entire membrane, the speaker did not want to be understood as doing that. There, again, is the very object of the Denker operation, because it allows the operator to see what membrane to remove, and what to leave. He is not working in the dark. The object of this operation is that you can work under the control of the eye, and see which parts you want to remove and which should be allowed to remain. That, he thinks, is one of the strong points of the Denker operation.

As to the flap: As he said in his paper, he was opposed to it; he has been converted, and hopes others will be. He has better results in healing with his present method.

Denker only insists on the removal of the membrane of the floor, and the healing of the flap will take place. Only the diseased membrane is removed.

Regarding packing, he read an article in a journal a short time ago—a discussion from Uffenorde, Hajek and Onodi—on the subject of nasal packing following operation, and they all said they did not believe in packing and did not practice it. He has been with all of those men and never saw them operate a case without packing. They all do it. He did not mean that the gentlemen present used packing, but there is a great deal of talk about not packing in the nose, and then a great many men do it afterwards. Personally, he believes, with Dr. Robertson, that if one is going to use a flap, a carefully applied dressing to retain the flap in position and at the same time promote drainage (don't call it a pack), will promote healing. So far as the rest of the points of the operation are concerned, he thinks they are all agreed.

ABSTRACTS FROM CURRENT LITERATURE.

I.—EAR.

Radium in Middle Ear Deafness Caused by Chronic Suppuration.

BRYANT (*New York Medical Journal,* July 4, 1914). The patient was a woman aged fifty-four years, who had been operated upon for recurring mastoiditis and chronic middle ear suppuration. She complained of loud and persistent tinnitus. The hearing was lost in the left ear and greatly reduced in the right. Radium was applied at intervals of five or six days (presumably three applications in all). Five milligrams of mesothorium bromid were used.

After the first application the tinnitus was relieved. After the last application it stopped and has never returned. The patient hears the voice now proportionately well. Her intellect is clear, and "from a person almost totally deaf, inaccessible and indifferent, she became observant and responsive."

Harris.

The Physiologic Treatment of Catarrhal Deafness.

ALBERT C. GEYSER (*New York Medical Journal,* July 11, 1914) states that at a recent meeting in New York he presented a series of cases suffering from "chronic nose catarrh," who had been deaf for from five to fifteen years, where previous treatment had been employed without effect, and where by the treatment which he recommends he had been able to very materially improve the hearing.

The treatment is based upon the physiology and pathology of the tissues involved. It consists of an irrigation of the nose with an alkalin solution, followed by an oily spray of iodin where atrophy is present, one of acetozone if hypertrophy is present. "The iodin irritates and stimulates tissue increase, and is a good germicide. The acetozone is a sedative to the mucous membrane, at the same time germicidal, antiseptic, anodyn, emollient." This preparatory treatment is followed by the use of high frequency currents for the atrophic cases, for the purpose of stimulating, and for the hypertrophy the diathermic current, which contracts. Where the nose is so obstructed that the electrodes cannot enter, electrolysis needles are employed. Anchylosis of the ossicles is treated by dry heat and passive motion. The external canal is freed from all effects by an alkalin irrigation, and then with the patient in a recumbent position the ear is filled with a warm alkalin solution. A piece of rubber tubing is introduced, almost to the ear drum. The negative pole of the galvanic current is placed into this rubber tube. The positive pole is placed on the nape of the neck. The eustachian tube will rarely require any treatment. Where it does, electrolysis is to be employed. Following this treatment, "patient, who could not hear an alarm clock tick one inch from the external meatus, frequently can hear a watch tick six to twelve inches from the affected ear." *Harris.*

Otitic Paralysis of the External Oculomotor Associated With Involvement of the Trigeminal.

GIGNOUX (*Revue Hebdomadaire de Laryngologie, d'Otologie et de Rhinologie,* February 7, 1914). The syndrome of paralysis of the oculomotor external, associated with ear trouble, which was first pointed out by Gradenigo, is now well known. The exact pathology, however, is still in doubt. Two theories are most in favor to explain it: the one that the paralysis is of a simple reflex character, the other that it is the result of a propagation of an infected area toward the intracranial cavity, producing either a neuritis of inflammatory or toxic origin, or especially a lesion of the meninges or sinus. Gradenigo has come now to feel that in every case there is an ostitis at the apex of the pyramid with an adjacent pachymeningitis. The author feels that the paralysis affection presents so many different clinical pictures, it is impossible to ascribe the same pathology in every case.

Gradenigo divides the cases into three groups. The first represents typical cases where the three characteristic symptoms are present—namely, acute otitis, paralysis of the sixth nerve and severe frontocoryzal pain. In the second group the three symptoms are associated with accessory symptoms, such as irritation of the third nerve, meningeal pneumonia, or otitic complications. The third group represents cases complicated with acute leptomeningitis, which terminate fatally. Recovery is usual in the cases of the first and second group.

According to Gradenigo, the infection proceeds from the middle ear to the apex of the pyramid, through the pneumatic cells around the tube and carotid. In the first group the lesion often remains extradural. In the second and third group the inflammatory phenomena are most extended and involve the adjacent nerves. The author has recently had a case under his care, of a child of nine suffering from double otitis the result of measles. The onset of the otitis was marked by elevated temperature, severe pain and phenomena suggesting meningitis, stiffness of the neck and Kernig. The day after he saw him, while the general condition had improved, there developed severe pain in the frontoparietal region of a paroxysmal nature. The diagnosis was made of circumscribed meningitis. Shortly after, oculomotor paralysis developed. The child continued to improve and made an uneventful recovery. A hypoesthesia, well pronounced, developed in the left suborbital region, indicating an involvement of the trigeminal. Baldenweek explains the associated involvement of the trigeminal by a bony lesion at the apex of the pyramid.

In eleven cases collected by this author, four have terminated fatally. The autopsies have borne out his view of the location of the lesion. He is inclined to put a most grave prognosis where the involvement of both nerves exist, and is of the opinion that it calls for immediate operation.

It is Gignoux's feeling that his case tends to disprove the position of Baldenweek, and points to a benign meningitis as the cause rather than a disease of the bone. This and other cases strengthen him in his opinion that there is no one pathogenesis for all cases. On account of the difficulty of determining exactly what is the cause in a given case, the prognosis cannot help being uncertain and the decision as regards operative procedure difficult. *Harris.*

Local Anesthesia for Operations Upon the Ear.

Arnal (*Revue Hebdomadaire de Laryngologie, d'Otologie et de Rhinologie*, March 14, 1914). After giving the history of its development and the anatomy of the parts involved, the author describes the various procedures which have been employed, including the mixture of Bonin, the method of von

Eichem, and that originally proposed by Neumann, as well as the modification which bears his name, and that of Gaugier, which consists in the introduction of a needle no longer through the canal but through the retroauricular groove.

Of the various drugs employed the author is in favor of cocain because of its more certain action.

His experience makes him a strong advocate of local anesthesia, but he recognizes that it has its limitations, first because of the dangerous affections of cocain in certain individuals, second the difficulties of injection in certain regions, and third the unsatisfactory results occasionally met with. Novococain is less active and seven times less toxic than cocain.

Harris.

Immediate Closure After Antrotomy in Acute Mastoiditis.

Moure (*Revue Hebdomadaire de Laryngologie, d'Otologie et de Rhinologie*, May 2, 1914). A communication from the pen of such a master as Moure on this much mooted question is most welcome. His operative experience is so large that any opinion he may express is bound to carry great weight. His conclusions are based upon thirteen hundred and eighty operations, of which seven hundred and twenty-three were radicals and six hundred and fifty-seven simple mastoids. He gives a résume of the different methods of treating the mastoid wound after operation, and then proceeds to divide his cases clinically into four groups.

The first group represents cases of acute osteomyelitis where the mastoid cavity shows red and bleeding cells isolated completely from one another, and filled with an oily fluid, not seropurulent. He regards these cases as decidedly grave and very infectious.

The second group represents the ordinary mastoid, filled with pus, where all the bony partitions have been destroyed.

In the third group the mastoid is filled with reddish granulations, bleeding easily. Here, also, the bony walls have been destroyed, including the cranial barrier, and resembles, in fact, an extradural abscess.

The fourth group represents cases of mastoid osteoperiostitis on the point of the opening. The inner and external tables are both thin, and the mastoid is reduced to a large fungating and suppurating cavity. These cases, in his opinion, are not particularly serious.

As a result of his long experience and observation, Moure is of the opinion that in the majority of cases of acute mastoiditis, the proper procedure is, after thorough and complete removal of all the disease, to immediately close the mastoid wound with the exception of a small opening for a drain, which can later be removed. This latter procedure he advises because of the fact that usually, even after the most complete operation, there is a slight serous discharge.

Harris.

Dressings Consecutive to the Mastoid Operation.

WEISSMANN (*Revue Hebdomadaire de Laryngologie, d'Otologie et de Rhinologie,* May 9, 1914). In this careful review of the various methods of dressing the mastoid wound following a simple or radical operation, the author favors the immediate closure without drain. He recognizes no risks in the method, and sees for it a healing much more rapid, occasions no pain and has a much more elegant result. He favors the same procedure following the radical operation, putting no packing through the auditory canal. He recognizes, with most aurists, that at the best, epidermization may be unsatisfactory or of poor quality, and urges the inspection of the wound at stated intervals.

Only in cases with endocranial or labyrinthine complications should the wound be packed from behind. He admits that he is a pioneer in omitting all dressing, but claims that in the cases where he has pursued this method, the results have been entirely satisfactory. *Harris.*

The Diathermo-Kinesiphone, or Auditory Reeducation, in Connection With Heat.

MAURICE (*Revue Hebdomadaire de Laryngologie, d'Otolodie et de Rhinologic,* May 16, 1914). The diatherm is a method of application of currents of high frequency capable of passing through the body without producing contractions, pain, or electrical effects, but which elevate the temperature. It has not been generally employed therapeutically, largely because the waves produced were so intermittent.

Maurice has devised an apparatus which obviates this difficulty and has recently employed it in connection with his kinesiphone. In cases where the kinesiphone has failed to produce the desired result, the combination with the diatherm has been most encouraging. The mixed treatment is to be used for the two symptoms of deafness and tinnitus. In cases where the kinesiphone has failed to relieve the tinnitus in twelve or fifteen treatments, the combined method has achieved the desired result. The author has not yet employed it for aural vertigo.

Cases of otosclerosis will not be benefited by the treatment, but in subjective tinnitus and neuralgic phenomena accompanying serootitis and subacute otitis, and chronic middle ear otitis, he recommends that it should always be employed. The indications are less numerous than for reeducation, but in the author's hands results have been twice as good as those obtained by reeducation alone. *Harris.*

Circumscribed External Otitis Simulating Mastoiditis.

Potella (*Archives Internationales*, May-June, 1914, p. 776) distinguishes between furunculosis of the canal and circumscribed external otitis. In furunculosis the infection is limited to a follicle which is surrounded by a zone of inflammation. The pain is usually limited, and ordinarily there is no edema of the surrounding tissues. When ripe the furuncle will break, even under the introduction of a speculum. Furunculosis is often the result of a constitutional disease. External otitis, on the other hand, usually depends upon an infection, the result of some abrasion, as from the finger nail. Here there is no definite limitation to the inflammation, which continues to extend until the retroauricular groove is obliterated and the clinical picture becomes one simulating mastoiditis. A true abscess develops and can be detected in the retroauricular region, and with more difficulty in the wall of the canal, which is reddened but does not give any pain.

The author argues that the two pictures are so separate that the distinction is not a theoretical one. In one case the cause should be sought outside the ear, in the latter case in some local condition in the canal giving rise to scratching. He reports two illustrative cases, showing the similarity to mastoiditis, and makes the following differential diagnosis:

External otitis: First, intact drum. Second, very severe pain when the lobe of the ear is displaced. Third, tumefaction of the anterior, posterior or lower wall of the canal, diminishing towards the drum.

Mastoiditis: First, perforation of the drum, pain on pressure over the antrum. Second, tumefaction of the posterior superior wall, which increases on approaching the drum.

Treatment consists in opening the abscess. In the case of furunculosis the incision should be made from within outwards, but in a circumscribed external otitis, externally inwards. The focus of suppuration is apt to be deep seated. Local anesthesia usually proves unsatisfactory, and general anesthesia (the author recommends somnoform) is to be preferred. *Harris.*

The Therapeutic Action of Adrenalin in Diseases of the Ear.

GOLDMAN (*Archiv. für Ohrenheilkunde,* December 22, 1913) states that an adrenalin spray in the epipharynx or a solution of adrenalin applied directly to the ostium of the eustachian tube will sometimes produce an immediate improvement of hearing, and a lessening of the subjective noises, even of long duration, in cases of chronic and acute tubal catarrh, and also in cases of otitis media that show a tendency to get better anyway. *Theisen.*

Two Fatal Cases of Otogenous Diffuse Leptomeningitis With No Bacteria in the Fluid Obtained by Lumbar Puncture.

HOLGER MYGIND (*Archiv. für Ohrenheilkunde*, December 22, 1913). First case: Man, aged twenty-five years, with a chronic right suppurative otitis media and cerebral symptoms. There were no meningeal symptoms. The fluid obtained by lumbar puncture was cloudy, with many polynuclear cells but no bacteria. A radical mastoid and labyrinth operation was performed. Six days later meningeal symptoms and coma developed. Spinal fluid at this time was only slightly cloudy. An exploratory operation failed to reveal a cerebral abscess, but a cerebellar abscess was found. At autopsy two other cerebellar abscesses were found, with a diffuse suppurative leptomeningitis. Diplococci were found in the abscess pus.

The second case was that of a young man aged twenty-two years, who was brought to the hospital in a somnolent condition. Caloric reaction was negative. Kernig and rigidity of the neck present. Lumbar puncture gave slightly milky fluid with many polynuclear cells but no bacteria. At operation a circumscribed pachymeningitis externa was found. Patient died two days later. Autopsy revealed a severe diffuse purulent meningitis with a localized external and internal pachymeningitis. In this case the spinal fluid was still free from bacteria five hours before death. *Theisen.*

II.—NOSE.

Why is Nasal Catarrh so Prevalent in the United States?

WOLFF FREUDENTHAL (*New York Medical Journal,* January 3, 1914) reverts to a subject to which he has given a good deal of thought and presented in previous communications. While he recognizes that a certain number of cases of nasal catarrh are infectious, he believes the great majority are of idiopathic origin.

He accepts Bosworth's position that in catarrh the amount of serum secreted by the nose is diminished, and in consequence there is a failure of proper mixture of the mucous secretion with failure of the mucus to pass off. He believes, however, that this is not due to hypertrophy of the mucous membrane, but to our present mode of living.

He places the largest emphasis upon the overheating in our modern apartments and tenement houses, with the pronounced diminution thereby of the humidity of the air. The average New York house in winter has not more than thirty to thirty-five per cent humidity. Even in our best hospitals there is a pronounced difference between the humidity of the air in the wards and that in the air outside. The dryer the air we inhale, the more moisture will be given off by the nose and the nasopharynx. The work of these organs will be so much greater with every particle of air we inhale. In consequence, a dry rhinitis and rhinopharyngitis develops.

Next to the lack of humidity in the air is to be mentioned the dust which is so widely found in our American cities and towns. As a means of preventing colds, and in that way catarrh, Freudenthal urges:

First, in order to lessen the great prevalence of catarrh, our systems of heating should be changed so as to allow much more moisture to evaporate in each living room. That is especially important in schools or meeting halls, churches, theaters, concert or lecture rooms, and assembly rooms of every kind. A pail of water in front of the heater is ineffective. We have to employ other means in order to overcome the deficient humidity indoors.

Second, in order to prevent colds we have to limit the amount of garments worn.

Third, exposure to draughts, rain, snow, and all inclemencies of the weather ought to be practiced by the youth, in order to prevent the most preventable of all diseases—colds.

Harris.

The Choice of Operation Upon the Accessory Sinuses.

MOURE (*Revue Hebdomadaire de Laryngologie, d'Otologie et de Rhinologie*, April 4, 1914) is not in favor of the intranasal operation upon the antrum, because of the liability of its incompleteness. He favors the Caldwell-Luc. Also, he is not in favor of the extensive operation upon the frontal sinus recommended by Killian, and insists that all that is necessary is a sufficient removal of the anterior wall to admit of complete removal of the mucous membrane. If this is done and the adjacent ethmoid cells are thoroughly cleaned out, the case is bound to get well.

The intranasal operation upon the frontal sinus is not recommended because of the liability of reinfection from the nose, even after a complete cure. The author is of the opinion that all operations upon the frontal sinus properly executed will be followed by complete occlusion of the cavity. On that account, a wide open nasal frontal canal has no advantage. He describes the experiments of a Russian colleague, Ssamoylonka, upon a series of cats and dogs. The sinuses were opened and the mucous membrane entirely removed. The animals were killed at varying periods of from one to six months. In every case when the sinus was exposed postmortem, the periosteum was found to have increased in size and a cicatricial fibrous tissue had developed which in six months or sooner completely occluded the cavity. Reasoning that the bone in animal and man is the same, the conclusion was drawn that of necessity this must be the result in the human being.

Moure himself has had occasion to open the frontal sinus in certain cases after operation, and has found the cavity entirely obliterated. The operation upon the frontal sinus completed, he introduces a tampon through the nose, and the wound is packed with iodoform gauze, the lower end of which is allowed to come out of the nose. This is removed in four or five days. The upper end of the packing rests at the internal angle of the incision in the skin. A drain is left in for from five to six weeks. *Harris.*

Angioma of the Ala of the Nose.

RENE-CELLES (*Revue Hebdomadaire de Laryngologie, d'Otologie et de Rhinologie,* April 11, 1914) reports two cases which, with one other described by Broca, are the only cases on record of angioma occurring in this locality. He does not include in his consideration of the subject angioma of the septum or of the turbinate. The growth is insidious in its onset, and presents itself as a sessile mass, reddish in color, covered with blood vessels lying anterior to the inferior turbinate, which it hides. The two chief symptoms are obstruction to breathing and a reddish discoloration of the nose externally.

He recommends thermocautery and excision as the best methods of treatment to be employed. *Harris.*

Neuralgia and Migraine of Nasal and Otitic Origin.

RAOULE (*Revue Hebdomadaire de Laryngologie, d'Otologie et de Rhinologie,* April 18, 1914). Neuralgic pains in the nose and ear are wont to be met with in disease involving the nose and ear. Mounier and Trepau have both described cases. They usually occur in two groups of cases, the first where there is a hyperesthesia of the mucous membrane of the nose, the result of a digestive or menstrual trouble, or of colds associated with migraine, pain in the eye, tickling in the throat and in the ear. Here there is a sensitiveness of the nasomucous membrane or nasomucosa to the touch of the probe, and an injection of the drum membrane more or less marked, with tinnitus and slight deafness. In this group of cases, according to the author, there is no question but that we are dealing with slight congestive disorders involving the nasal, pharyngeal and tympanic mucous membrane, in conjunction with marked irritation of the sympathetic. The second group of cases represent the violent pains which occur in the frontal region and in the ear in acute coryza, simulating a sinusitis or a severe catarrh of the middle ear, in patients already suffering from chronic nasopharyngitis. These symptoms return at intervals, but with all the signs of an inflammatory involvement. Here a catarrh of the middle ear is recognizable. With the pain is wont to be found deafness and tinnitus.

In both groups of cases there is a congestive or inflammatory element, together with a nervous reflex involving the sympathetic system. In the second group the inflammatory element is the more important.

Nasal treatment is wont to cause the painful sensations to disappear. The symptoms in ear often, however, persist in spite of treatment, and the deafness and tinnitus, at first intermittent, become permanent. For this group of cases the catheter gives no benefit. The author has, however, secured prompt results from the use of electricity. *Harris.*

Reorganization of the Septum After the Submucous Resection.

MERMOID (*Archives Internationales,* May-June, 1914, p. 17) reports a case of a man aged forty-five years who had been operated upon two years before for a resection of the cartilaginous septum. The patient required further operative work. On making an incision, no trace of cartilaginous tissue was found. In view of this, he regards it entirely useless to attempt to preserve the perichondrium and the periosetum with a view to the reformation of cartilage or bone. He recognizes, however, that these membranes are desirable in order to strengthen the new septum. *Harris.*

A Case of Pseudotumor of the Orbit.

RUTTIN (*Wiener medicinische Wochenschrift,* No. 1, 1914) reports a case in which for four weeks there had been swelling of the lids followed by a rapidly developing exophthalmos of the left eye. The eyeball was displaced downward and forward, the up and down movements being very much interfered with. A little later a firm mass could be felt just under the upper orbital ridge. The Wassermann and tuberculin reactions were negative.

Examination of the nose showed a swelling of the lower turbinate. This was removed, but no suppurative process in the accessory sinuses could be determined. A piece of the mass was then removed for microscopic examination, and this showed simply inflammatory changes with no definite findings. An energetic treatment by mercurial inunctions was followed by a disappearance of the tumor and the exophthalmos. The movements of the eye became normal. *Theisen.*

Accidents Following Puncture of the Antrum.

KILLIAN (*Verhand. Verein Deut. Laryn.*, 1913, p. 217) has added to the already large list of unfortunate and fatal accidents following the ordinary washing of the antrum several new observations. In a number of cases he has observed, a few hours following the washing, a sudden chill followed by a temperature of thirty-seven degrees. In three hours the temperature is again normal. A satisfactory explanation is difficult. It is probably due to a stirring up of fever producing organisms, which up to the time of the washing had remained quiescent and were awakened into activity by the washing.

In another case the patient suddenly became blind in one eye. In fifteen minutes the sight began to return, and recovery followed in a few days. The attack was accompanied by a chill and fever. The ophthalmologist was inclined to credit the blindness to a small embolus in the central artery, but Killian believes that the matter could be explained by reflex contraction of the vessels.

In a third case, where Killian had noted that a slight feeling of faintness had followed a washing, he had decided not to repeat the procedure, but the washing was carried out by an assistant, who was unaware of this fact. The patient suddenly died, and the autopsy showed nothing to explain the death. It was found that the water used in the washing was slightly cold. Death was probably due to a reflex from the vagus. *Horn.*

The Secretion in True Ozena.

AXISA (*Monatschr. f. Ohrenheilkunde*, Vol. 6, 1914), taking as the basis of his thesis the work of Ründstrom on the etiology of ethmoiditis exulcerans, after a study of twenty-one cases of true ozena, concludes that this disease is caused primarily from a diseased condition of the ethmoids and sphenoids. Of the bacteriology of the disease he has nothing to say; but his careful observations on the manner in which the pus is formed, as studied from hour to hour, his brilliant results after a thorough cleaning out of the ethmoids and sphenoids, are worthy of very careful study and thought.

The secretion which forms on the septum and turbinates is always free from odor and does not lead to the formation of the real ozena crusts. These latter are formed solely from the secretion of the diseased cells. His studies were made in Egypt, where cases of ozena are very common. He selected for observation twenty-one cases, in which fourteen were completely healed after thoroughly cleaning out the ethmoids and sphenoids. Eight cases were very much improved. The treatment covered a period of six to eight months, and consisted, after the operative work, in painting the surfaces daily with a silver solution (strength not given) and packing the nose with mentholated oil.

He concludes:

1. The ordinary superficial secretion of ozena is of a purely secondary nature.
2. The crusts which are formed from the secretion of the mucous membrane of the nose have nothing in common with the true crusts of ozena.
3. Ozena crusts are formed exclusively from secretion derived from the diseased ethmoids and sphenoids. They are formed first in the accessory cavities themselves, and then push out as extensions into the nose.
4. Real crusts which form at the lower border of the middle turbinate are derived from secretion which drops out of the cells.

Horn.

III.—PHARYNX.

The Results of Tonsil Operations on Public School Children in New York City.

Gerhard Hutchison Cocks (*New York Medical Journal,* January 17, 1914) has examined one hundred and seven children referred to him by the school doctor for operation. The object of this investigation was twofold: "First, to obtain information which would warrant a request for more funds from the board of estimate for the care of adenoid and tonsil cases in the municipal hospitals; second, to ascertain whether any improvement could be made in the methods employed in the schools for the disposition and treatment of these cases."

As a result of this investigation, he makes the following observations:

1. Of one hundred and seven children examined, eighteen, or approximately sixteen per cent, failed to have the operations performed.

2. Of eighty-nine cases operated on, nine, or approximately ten per cent, received mutilations of the soft parts adjoining the tonsils.

3. Of twenty-one cases operated on without general anesthesia, nineteen, or over ninety per cent, were badly done.

4. Of fifty-two cases operated on with general anesthesia, twelve, or twenty-five per cent, were poorly done.

5. If we add the number of cases receiving mutilations to the number of cases badly operated on, both with and without general anesthesia, we have 26.9 per cent poorly done. In addition, there were thirty-one children who required further treatment for nasal conditions. It is, therefore, clear that the system now employed, notwithstanding its usefulness, can be materially improved.

He draws the following conclusions:

1. A greater number of medical inspectors are needed.

2. School physicians and nurses should exercise more care in seeing that children referred for operation carry out their recommendations.

3. When children are referred to hospitals or clinics they should be sent to institutions which maintain nose and throat departments. This is to avoid attacking the tonsils when the anterior nares are at fault.

4. Hospital physicians would do well to remember that a child, referred with a card from the school physician, is often sent simply for diagnosis and treatment. Such a card is not an indication that an adenoid and tonsil operation is imperative or even advisable. The hospital physician should carefully examine and decide each case on its own merits. The mere presence of a pair of healthy tonsils in the child's throat does not necessitate operation. There should be some good indication, viz., mouth breathing, recurring attacks of earache

or tonsillitis, deficient physical or mental development, etc. If operation is contraindicated, the doctor should always note this fact, together with the diagnosis and treatment, on the card provided for this purpose by the school authorities.

5. All adenoid and tonsil operations on children should be done under general anesthesia.

6. Hospitals where adenoid and tonsil operations are performed should be equipped to keep their patients in the wards for at least eighteen to twenty-four hours after operation.

Harris.

A Case of Vincent's Angina Occurring in the Lingual Tonsil Alone.

GESEZ (*Revue Hebdomadaire de Laryngologie, d'Otologie et de Rhinologie,* March 28, 1914). With the exception of a case reported by Moure in 1909, the author's case is the only one on record where the lingual tonsil was alone involved. The patient was a woman of fifty-two years, where the disease gave general and local symptoms of an alarming type. The lingual tonsil was found covered with a whitish deposit giving the appearance of a pseudomembrane. There was a general hyperplasia. On the left side an area of ulceration could be detected. Digital examination could detect no difference in the two sides at the base of the tongue. It caused a slight amount of pain. Bacteriologic examination of the smear showed the characteristic fusiform bacilli and spirilla.

Under a treatment of milk, eggs, vichy water, chlorid of potash, with irrigation of the mouth with peroxid of hydrogen, a prompt and rapid recovery took place. The author dwells upon the differential diagnosis, especially from diphtheria of the locality involved, and of the importance of the bacteriologic examination *Harris.*

Malignant Tumors of the Pharynx in Infants.

JEANNERET (*Revue Hebdomadaire de Laryngologie, d'Otologie et de Rhinologie,* April 18, 1914) reports a case of carcinoma of the pharyngeal tonsil in a child of six years, and a case of round cell sarcoma of the pharyngeal wall in an infant of six weeks. He has been able to find in the literature only fourteen cases of primary malignant growth in infants. He concludes, very properly, then, that they are exceedingly rare.

The tonsils are most usually the locality to be involved;

less frequently, the soft palate, and exceptionally, the pharyngeal wall. Sarcoma of an infantile type is most frequently met with. Carcinoma is exceptional.

The case of sarcoma reported by the author is regarded by him as congenital, and shows that the pharynx can give rise to a malignant growth apart from any factor of irritation, bearing out the theory of Cohnheim, that there may be an overproduction of cells designed for a particular organ, so that the surplus go to form a new growth. All tumors of the pharynx in infants have a very rapid growth and the prognosis is absolutely bad. *Harris.*

Epithelioma of the Palatine Recesses.

ESCAT (*Revue Hebdomadaire de Laryngologie, d'Otologie et de Rhinologie*, July 11, 1914). Epithelioma of the palatine recesses is more usually known by us as of the supratonsillar fossa. Escat, after describing the anatomy of this, reports three cases of epithelioma of the region which have passed under his eye. From the study of these and other cases he describes epithelioma in this region as falling into one of two classes, the first being the endopalatine form, which is characterized by a development outside of the pharynx. This may take the form of a tumor of the neck, and the first symptom referable to the throat is either a cervical adenitis or a hemorrhage from the supratonsillar fossa, or an attack of angina. The second class is the form developing within the mouth and giving symptoms suggesting a gumma.

[The reporter has had under observation while reading this article a case falling under the first class—that is, a cervical adenitis, presenting itself because of angina. A peritonsillar abscess was diagnosed and opened, with the escape of pus. Later a new growth was discovered and found upon examination to be an epithelioma.] *Harris.*

IV.—LARYNX.

Prelaryngeal Tubercular Adenitis.

LIEBAULT (*Revue Hebdomadaire de Laryngologie, d'Otologie et de Rhinologie*, January 3, 1914) reports three cases that have been under his care. The glands are situated on the cricothyroid membrane. Sometimes the adenitis is accompanied by an endolaryngeal tuberculosis, and at times the larynx is free. The symptoms are those of tubercular adenitis elsewhere. The diagnosis offers no difficulties.

Treatment is either medical or surgical. The author recommends the injection of thymol 100, camphor 200, into the diseased gland. This treatment in one of his cases achieved a complete cure. *Harris.*

Local Heliotherapy in the Treatment of Laryngeal Tuberculosis.

Sari (*Revue Hebdomadaire de Laryngologie, d'Otologie et de Rhinologie,* January 10, 1914) in his treatment of tubercular cases at Nice has used for a number of years sun rays. His method is very simple, consisting merely of the employment of a laryngeal mirror which is held in place for from twenty to thirty minutes twice a day. He gives a number of clinical reports where he has employed the method to advantage, and states in conclusion that he has observed cases with benefit to the ulcerated area. It has aided in the spontaneous elimination of tubercular granulation, and in all his cases has served to relieve pain and often causes its complete disappearance. In a word, the procedure is indicated because of its analgesic, dicongestating and bactericidal qualities.

Harris.

Resection of the Superior Laryngeal Nerve in Dysphagia of Tuberculosis.

Henri Aboulker (*Revue Hebdomadaire de Laryngologie, d'Otologie et de Rhinologie,* May 30, 1914). In certain cases the treatment of the nerve with alcohol does not give lasting results. For this or other reasons, the author recommends resection of the nerve. He has practiced the method in two cases. In the first, the result was all that could be desired. In the second case a bilateral resection was made. This was followed by progressive dyspnea, tracheotomy and death.

The method employed is that of an incision midway between the hyoid and thyroid, extending to the sternomastoid. A dissection with a grooved director is made until the laryngeal artery and vein are encountered. The nerve will be found above and on a plane deeper than these vessels. At times the capsule of the submaxillary gland will have to be raised.

One centimeter of the nerve is resected. The operation is to be done under local anesthesia. In the first case the dyspnea disappeared immediately after the operation. *Harris.*

Indications and Technic of Laryngectomy for Cancer.

LOMBARD (*Revue Hebdomadaire de Laryngologie, d'Otologie et de Rhinologie,* June 13, 1914). The postoperative mortality in laryngectomy has been considerably lessened in recent years. This is due, first, to the improved surgical methods upon the upper respiratory tract; second, to the extreme care with which the operation is carried out; third, to the combination of local and general anesthesia or the entire suppression of the latter in certain cases; fourth, to the importance given to the preparation of the patient and to the minute care after operation.

Controlling results have been carried out by the Spanish school. The remarkable results of Glück are due to the minuteness in details and the perfection exercised in the execution of each of them. The author favors local anesthesia, in spite of certain objections, such as that at times it will not last sufficiently long for the operation and that adrenalin solutions predispose to a late hemorrhage or a hematoma. The carrying out of the operation in two stages has advantages as well as disadvantages, which are recognized by even those who have performed it. One merit is that it allows the testing of the endurance of the patient.

The article is accompanied by statistics up to 1911. These show in two hundred cases performed by Botey a mortality of seventeen per cent, recurrences of fifty-two per cent, healing after three years of twenty per cent, patients lost sight of after operation of eleven per cent. The statistics of Glück are incomplete, but show one mortality in a series of eighty-four cases. *Harris.*

Laryngeal Phthisis and Pregnancy—The Actual Status of the Question.

IMHOFEN (*Archives Internationales,* May-June, 1914, p. 717). Speaking from a large experience as an obstetrician, after dwelling upon the importance of a careful getting together of laryngologist and accoucheur, Imhofen is of the opinion that pregnancy as a complication of tuberculosis of the larynx is exceedingly rare. In over nine thousand confinements he has seen only eleven cases. Neither clinically nor microscopically can it be shown that the pregnant woman is more predisposed to laryngeal phthisis. At the same time his anatomic and pathologic studies explain the subacute course of tuberculosis of the larynx during pregnancy.

Pregnancy renders the prognosis of tuberculosis of the larynx very grave, the mortality varying from eighty-six to ninety per cent. The confinement can give rise to a state of edema in the lesions in the throat or even produce dyspnea.

As regards treatment, it is his opinion that if a pregnant woman suffering from laryngeal tuberculosis presents herself for treatment in the first five months of her pregnancy, an artificial abortion with castration is to be advised. The course of treatment is quite different if she presents herself at an advanced stage of her pregnancy, where the laryngitis is apparently inactive, or if the patient comes only at a time when she needs attention. In either case the confinement should be allowed to proceed without artificial means. The results of bringing on labor are deplorable. Almost without question the result is fatal. As concerns the infant, the statistics are not brilliant, from thirty to forty per cent only of the children survive. Nevertheless, the prognosis is less somber than for the mother.

The fatal evolution of the lesions of the larynx is due to the histologic peculiarities of the diseased mucous membrane. On this account the treatment should be very conservative. If curative tracheotomy is indicated, it should be carried out. In none of the author's cases has it been necessary, however. Preventive tracheotomy, because of an eventual dyspnea during confinement, is another question. The author does not recommend it. The dyspnea is never sufficient, in his experience, to require it. *Harris.*

Case of Spontaneous Healing of Cancer of the Larynx.

PUGNAT (*Archives Internationales,* May-June, p. 761). The patient was a man of sixty years, who had suffered for a number of years from the presence of an oval reddish growth the size of a bean, which occupied the entire left arytenoid region, extending above the left cord, which was entirely concealed. The right arytenoid was entirely normal. No ulceration of the growth was present. Palpation showed a large lump in the submaxillary region on the left side, the size of a nut and hard in consistency.

A clinical diagnosis of a malignant growth of the larynx was confirmed by a microscopic examination of a section removed. Surgical interference was refused. Solution of adrenalin was prescribed, to be administered with a laryngeal syringe. Some weeks afterward the patient was seen, and the growth was noticeably diminished. The voice became almost normal. The anterior two-thirds of the left cord became visible. Four months later the tumor was reduced to half its size. At the end of the fifth month no more hoarseness existed. At the end of the sixth month the larynx was entirely normal, not a trace of the growth could be discovered. The cachexia present in the patient disappeared.

A year later the patient presented himself because of the appearance of a growth beneath the left maxilla. This was found to be an enlargement of the mass in that locality noted at the time of the original visit. The larynx was perfectly normal. The tumor grew rapidly in the neck, causing trouble with circulation. Cachexia presented itself, and two months later the patient died, the result of hemorrhage from the carotid.

The author refers to a book by Powers on "Vanishing Tumors," where a number of similar cases are described.

Harris.

Papillomata of the Larynx in Children.

CHIARI (*Wiener medicinische Wochenschrift,* No. 39, 1913). The writer's paper is largely statistical, and some interesting facts in regard to the frequency of laryngeal papillomata in children, and the results of different methods of treatment, are brought out.

V. Bruns, up to 1878, had collected forty cases that had been treated intralaryngeally only, with thirty cures, three partial cures and five recurrences, while in two cases the result of the treatment was not known.

After the introduction of cocain the endolaryngeal operations for the removal of papillomata increased very greatly.

Between 1879 and 1896, Rosenberg gives the records of forty-eight cases, the majority of the operations having been performed under cocain anesthesia. Thirty-one cases were cured, and six improved. There were seven doubtful results, one recurrence and three deaths.

Of twenty-three cases from Chiari's clinic in Vienna, tracheotomy was performed in ten with one death, two recurrences and six cures, after endolaryngeal methods employed later. One case was not cured.

Thyrotomy should be performed only in the worst cases.

Rosenberg arrived at the following conclusions in this respect: The operation is particularly dangerous during the first four years of life, over thirteen per cent of the operations resulting fatally; hoarseness, because of injury to the vocal cords, frequently follows; permanent strictures may result and recurrences after thyrotomy are frequent. He quotes Austin, who performed thyrotomy seventeen times on the same child for recurring papillomata.

The author comes to the following conclusions: Intralaryngeal operations under cocain anesthesia should be first attempted, particularly in older children. If the indirect methods fail, direct laryngoscopy under general anesthesia should be employed. When extreme difficulty in breathing develops, tracheotomy should be performed, and later, with the canula in place, operations may be performed by either the direct or indirect methods. *Theisen.*

V.—MISCELLANEOUS.

Quinin and Urea Hydrochlorid in Nose and Throat Surgery.

ARTHUR J. HERZIG (*New York Medical Journal,* March 14, 1914) has employed quinin and urea hydrochlorid in three hundred and ninety cases. His technic is as follows:

"I use a four per cent solution of urea and quinin, mixed with boric acid, to prevent fermentation, in the proportion of one to one hundred, after instructions to clear bowels the day previous to operation and no meal four hours before operation. I now have my patient, if a child, prepared in a morning dressing; if an adult, prepared simply with sterile towels and gown. I inject ten minims into the anterior pillar of the fauces, high up, where one would incise a peritonsillar abscess, and ten minims, low down, in the posterior pillar of the fauces. This latter part of the injection cannot always be done where there are very large tonsils present. In fact, one-half of my cases have only one injection made, namely, in the anterior pillar. No pain is experienced in the single injection method. For the adenoids I use a fifty per cent solution prepared in the same way, but only swab this on with a postnasal applicator. The anesthesia here is nearly as complete as that of the injection. I now have my patient wait from ten to fifteen minutes. I then proceed to perform my tonsillar resection and removal of adenoid tissue, as if any other anesthetic had been used."

He has employed the method for four years. In none of the patients operated upon was there any apparent pain, and in older children and adults, where one could get an intelligent answer, this was plainly told. Gagging was the chief symptom complained of. No case showed hemorrhage five minutes after operation. Soreness of the throat after operation was present, although there was anesthesia lasting from two to eight days.

Quinin is the anesthetic, and urea, by means of its irritant properties, causes an edema which acts as a hemostatic.

Harris.

ANNALS
OF
OTOLOGY, RHINOLOGY
AND
LARYNGOLOGY.

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ORAL TUBERCULOSIS.

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In taking up disease of any organ, cavity, or part of the body, it must be considered in relation to other organs affected by the same disease, or in relation to the frequency of affection of the given part by other disease.

In considering this subject it is difficult to separate cases where contiguous organs are involved, therefore, some cases of tonsillar and pharyngeal tuberculosis must be included, but only those where, at the same time, tuberculosis of some part of the oral mucosa has been found.

ETIOLOGY.

All authors divide infections first into primary and secondary, but some authors, as Lake, class secondary cases in the primary class, simply because they consider any infection primary unless there is pulmonary involvement. All cases will be considered as primary if the lesion described is the first demonstrable tuberculous focus in the body.

That the mucous membrane of the oral cavity is not attacked by disease with greater frequency has been marveled for ages. The theories advanced to explain this apparent immunity are many: First, we have the rich blood supply to the parts; second, thickened layer of epithelium; third, the constant movement of the tongue and cheeks, keeping the parts clean; fourth, the supposed germicidal action of the salivary secretions; fifth, mechanical protection offered by mucus; sixth, protective action of various bacteria in being antagonistic to various other organisms.

It must be admitted that in any case where one of the protective influences is lacking, infection may take place. Realizing the varied conditions under which we live, and with diseased conditions surrounding this cavity on all sides, it is only to be wondered that infection does not more often occur. Considering the number of wounds of the oral mucosa which take place in the healthy subject from biting the tongue, cheeks or lips alone, and which are apparently healed within twenty-four to forty-eight hours with no sign of infection, we should reasonably expect transplanting of infectious material from one organ to another in the individual with diseased respiratory tract. This is especially to be expected in connection with the mouth, as it is used as an accessory respiratory organ in many cases, and because of the infectious material coughed from the lungs or aspirated from the nasopharynx passing over its surfaces.

Mouth infection from the gonococcus is exceedingly rare, although the conjunctiva is frequently involved; in a few cases the oral cavity of the newborn has been found affected; there is only one case of infection of an adult known to the author, which was reported by Cook.

The different lesions due to the tubercle bacillus show, the author believes, different modes of infection, just as we find in the laryngeal and nasal manifestations of this disease.

Tuberculosis of the mouth manifests itself in the following form:

1. Nodes and nodules.
2. Tuberculoma or tuberculous gumma.
3. Tuberculous abscess.
4. Tuberculous papilloma.
5. Tuberculous fissure.
6. Tuberculous ulcer
    - Lupus ulcers.
    - Tuberculous ulcers.
7. Tuberculosis of salivary glands.

Infection in primary cases, and it is at present an established fact that such may occur, is either through the intact epithelium, solution of its continuity, or through a cavity in a tooth in which the pulp has been exposed by decay.

That bacteria can be made to pass through the intact epithelium of the mouth, although with difficulty, certainly much more than through the tonsil, has been proved by Dmochowitz, Wood, Grocler and others; and through the larynx by Orth and E. Frankel. However, this probably very rarely occurs, as injuries to the mucous membrane of mechanical origin, as well as chemical and thermal injuries to the epithelium, prepare the way so very frequently that it is not necessary to assume the passage of bacteria through the intact epithelium. Cracks and fissures of the tongue and lips, from drying of tissues, in mouth breathing, predispose to both primary and secondary infection, and they are a special factor in the secondary form, as a large number of patients suffering from pulmonary tuberculosis are mouth breathers. Furthermore, decay of the teeth, with lodging of débris at the gum margin which may work below the epithelium by the side of the tooth, carrying bacteria with it, is a frequent occurrence.

All these contribute to primary infection, which is very rare when compared with the number of secondary cases found.

Adami and Nichols seem to regard hematogenic infection, in cases of pulmonary tuberculosis, as proved. They refer to it as follows: "It used to be, and in many quarters is still, accepted by clinicians and pathologists, that tuberculosis of the lungs is bronchogenic as a rule. It should be mentioned, however, that by certain observers, notably Ribbert, Aufrecht, and Baumgarten, a more or less successful attempt has been made to diagnose this. Ribbert, while not denying absolutely that infection may take place by inhalation, believes that pulmonary tuberculosis is usually hematogenic in the sense that the peribronchial glands are infected through aerial transmission by way of the buccal mucosa, and that when they break down the products of the destructive inflammation are discharged into the blood and so reach the lung. Baumgarten goes still further and holds that the glands are also invaded hematogenously. The experience of Aufrecht would seem to prove that it is impossible for bacilli to reach the terminal bronchioles and alveoli through inhalation, and postmortem evidence also supports this contention. It would seem probable that we would have to give up the view that the bronchi are the first structures to be attacked, and adopt a modified inhalation theory somewhat similar to Ribbert's, admitting an infection through the blood or lymph stream from the mouth and nose and upper respiratory passages." These authors also mention the work of Ravanel, which is along the line of Wood, Robertson and Goodale, that ingested tuberculous material may be found in the tonsils and bronchial glands.

If the contentions of these investigators are true, why do we not have more cases of primary tuberculosis of the nose and mouth if infection takes place through the mucosa of these cavities, and why do we not also find tubercle bacilli in the blood? If infection through the buccal mucosa without injury to the epithelium reaches the lungs through the blood stream, why should the larynx, esophagus, pharynx and brain, or even the tissues of the neck, not be involved instead of the lungs?

The investigations of Cornet, by inoculation of nearly three thousand guinea pigs and rabbits in different parts of their bodies, show that the first tuberculous changes are found on the spot of inoculation, or in the lymphatic glands draining that region. These experiments have resisted practically all contradiction, as most other experimenters have found the same to be true. A very few exceptions to this rule might be explained on the ground of faults in technic, or in anomalies of the lymphatic system, but these exceptions are so few that they can practically be ignored.

The mode of infection in secondary tuberculosis of the oral cavity differs but little from that of infection of the larynx, pharynx or tonsil. It is highly probable that the nodular infections, the tuberculomata, socalled, and tuberculous abscesses, are of either lymphatic or hematogenous origin, as they all make their appearance in about the same way. First, a rounded eminence, which either gradually enlarges or remains about the same size for months or years, when it shows a slight ulceration on the eminence. This gradually breaks down, allowing the discharge of pus, or shows a granulomatous condition which quickly disintegrates and exposes a cavity with undermined edges.

On section, the wall of the abscess does not differ from that of a tuberculous abscess elsewhere. It contains miliary tubercles in which are found giant cells and tubercle bacilli. The pus may not contain enough tubercle bacilli to be demonstrable, but on inoculation of guinea pig, death from tuberculosis will be produced.

Nodes appear on the tongue, according to Butlin, as small tubercles from one to four millimeters in diameter; too small to attract attention except where the tongue is one of the organs included in an actue miliary outbreak. The nodules, or small yellowish lumps, are caused by the fusing of several of these tubercles, which may be as small as a pin point, or become as large as a hazelnut before breaking down. In these cases they resemble tuberculoma. Butlin considers the following as points for diagnosis: The absence of signs of past syphilis and the failure of antisyphilitic remedies, evidence of tubercle in patient, lupus or glandular scars, tubercle bacilli in sputum, if patient has pulmonary involvement.

Attention, however, must be called to the fact that it is difficult to differentiate between syphilitic scars and those produced by lupus. The Wassermann reaction in syphilitic cases relieves us of the necessity as well as of the waste of time incident to the therapeutic test.

Tuberculoma is a term which, with our present knowledge of tuberculosis, should be eliminated, as it means nothing more or less than a tubercle which is formed because of fusing of many small tubercles. It may go on to abscess, or may undergo practical calcification; or, if it ceases to grow, we may have extensive fibroid changes in the capsule with caseous degeneration, and the supposed tumors remain for years without change.

These tubercles may be single and may remain for years without discomfort except for the slight enlargement.

Notable in this connection is the case of Richardson, a young lady, nineteen years of age, who had a tumor mass in the middle of the dorsum of the tongue. The patient believed this condition had been present since childhood. The case had been under Richardson's observation for about one year, when this mass became suddenly active, causing excessive pain in the throat and ears; this was relieved by the evacuation of a thick caseous pus.

The cases of de Brun, de Bois Nor, Thorner, Kyle, and Goselin and Fano come under the same classification.

On the other hand, multiple tumor-like masses are found less frequently, either in the tongue or elsewhere in the mouth, although nearly all cases show tubercle in the surrounding tissue; but these are small, while those that are called nodules are represented by such cases as that reported by Barth. In his case there were a large number of nodules giving the so-called fossilated appearance and varying in size, several of which later broke down, forming ulcers.

According to latest investigation it has been found that when tubercle bacilli introduced into the lymph or blood circulation lodge on the wall, they are almost immediately taken up by the endothelial cells, causing them to become swollen. It is to be seen by this that the first reaction on the part of the tissue is a cell growth and not a cell destruction.

These cells are what have been known as epithelioid, and, as takes place when any foreign substance is introduced into the tissues, lymphocytes collect around these socalled epithelioid cells, at first only polynuclear, but later lymphocytes.

From this proliferation and swelling the capillary involved becomes occluded, and the surrounding vessels will later become occluded in a similar way, so that if the process begins in a vessel, it will later become an intravascular formation. It is easy to be seen that the first stage of the formation of the tubercle is a cell proliferation. One or more of these endothelial cells may grow to a large size with a diminution of the nucleus, or several may fuse to form a giant cell. Which of these takes place more frequently is a matter on which pathologists differ.

It has been proved that dead tubercle bacilli will produce all of these early changes. This may be taken to mean that these stages are induced by the gradual diffusion of the intracellular toxins.

It is also believed that cell proliferation may be produced by the toxins liberated by living bacilli, or by those liberated by tubercle bacilli which may be killed by the lymphocytes or endothelial cells. It has been suggested by Prudden and Hodenpyl that this cell proliferation may be produced by the toxins acting in a dilute solution in the tissues, which accounts for the first stages being produced by the introduction of dead bacilli. while the living organism, producing the toxin in larger quantities and more concentrated, will finally occasion necrosis. This also explains the poor staining qualities of the giant cell as one side of it begins to necrose. It is also peculiarly significant that the tubercle bacilli are found on the side where necrosis is taking place, although broken down bacilli may be found in the central portion. The nuclei in the giant cell are found arranged in the form of a crescent, and surround this necrosed mass.

The tubercle early presents a giant cell in the center, surrounded by larger epithelioid cells with lymphocytes interspersed. These are found as typical round cells in subacute and chronic inflammatory conditions, at other times polymorphonuclear leucocytes. Surrounding this may be found some capillaries showing dilatation, but not markedly so, as is found in acute inflammation.

Necrosis of this area progresses in proportion to the rapidity of the growth and multiplication of the bacilli, and we have an increase of volume of this central area, and necrosis of the caseous type. As further progression takes place the cells lose their power of taking the stain, and lose their outline, besides undergoing granular and fatty degeneration. Around this caseous mass filling the center we have arranged younger giant cells, and these increase in number, enlarging the ring as the central areas increase in size; and so this growth may go on, especially in the tongue, until the mass is not only visible to the naked eye, but also becomes of such proportions as to be compared in size with beans or nuts. Attention is also directed to the fact that the bacilli are not only intracellular, but are found interstitial as well.

If any bacilli escape, they are either destroyed by the endothelial cells or leucocytes, or are carried by the latter to other parts of the body where they come to rest; most probably in the lymph spaces, where they form new foci for dissemination in acute cases, or new tubercle in chronic. If these tubercles in their continued growth come in contact with the wall of a large blood vessel bronchus or surface, we may have necrosis of the wall and the formation of an ulcer.

Further, tubercles may become calcified, and the procedure is somewhat similar to encapsulation in any chronic abscess condition. The tissues become somewhat accustomed to the toxins and the bacilli are probably weakened so that the tissue adapts itself to the existence of the foreign substance within it, then the fibroblasts, which are found in the periphery of the tubercle, develop into fixed connective cells, forming a thick capsule.

It has also been proven that a tubercle may be absorbed, as is seen in peritoneal tuberculosis, and in some cases of joint tuberculosis.

What effect mixed infection may have upon tuberculosis is no longer a question, except as it affects different tissues. We know that the epithelial tissue proper is not affected by tuberculosis; and Ely claims that connective tissue is never affected by tuberculosis unless we also have infection with other organisms. Many pathologists do not agree with this theory, but from the standpoint of the stomatologist it makes very little difference, as we probably always have mixed infection. Cases of secondary hematogenous infection from the pulmonary lesion may possibly prove exceptions, as we may also have other organisms associated with the tubercle bacillus.

It is well known that cases with mixed infection are more rapidly fatal, or are not as amenable to treatment as those in which this is a pure infection. This may account for the old idea that the nearer the exterior of the body the worse the prognosis in tuberculosis. If this were entirely true, as it is undoubtedly to a certain extent, but for a different reason than given by the older authors, it may be due to the more frequent occurrence of mixed infection. However, the patient is weakened by disease, the tissues of the mouth and pharynx being deprived of their rich blood supply, two foci of tubercle develop, together with the interference with nutrition caused by the difficulty in either mastication or deglutition, or both, and thus seriously handicapped the patient comes frequently to an early end. This applies only to cases of secondary localization of the disease in the mouth. Until the last few years a bad prognosis was given every case of laryngeal tuberculosis.

The fact that many cases of oral tuberculosis break down after healing does not prove the tubercle to be any different than in the larynx, lungs, or any other part of the body. The least lowering of vitality, either in a general way or locally, tends to favor development of bacilli already present. It has been proven in cases of quiescent tubercles that the bacilli remain alive for years, since they prove fatal to guinea pigs. In still other cases we may have sterile pus.

There is very little difference of opinion regarding the location of the lesions of tuberculosis in the mouth, although some modern textbooks, notably McFarland's Pathology, give the base of the tongue as the most frequent location of tuberculous ulcers.

The writer's investigations seem to prove that the parts are affected in the following order of frequency:

1. Tongue, tip.
2. Tongue, border and floor of mouth.
3. Palate, soft, anterior pillar, and uvula.
4. Tongue, dorsum and base.
5. Lower jaw and gums.
6. Upper jaw and gums.
7. Lips.
8. Palate, hard.
9. Salivary glands.

This corresponds closely with that given by other investigators. However, a decision is very difficult to obtain, inasmuch as many reporters fail to state explicitly the part affected. This may be due either to unfamiliarity with the nomenclature applied to the mouth, or to carelessness. We have, at times, appearing in the mouth and more frequently upon the tongue, what the patient describes as a blister, and it looks very much like one if observed before it breaks down. This, apparently, is a small tuberculous abscess, which breaks down and liquefies suddenly so that fluid is seen under the mucosa. It is probably due to mixed infection, the secondary organism gaining entrance to the tubercle through the epithelium.

The writer has observed this lesion in two cases, Nos. 7 and 14. One of these died within ten days after the appearance of the lesion, and the other lived about two months. It first breaks down in the middle as a fissure, as these blisters are always oblong, and leaves an ulcer with overhanging edges but with a soft base. The edges show no tendency to slough, but the overhanging portion, if on the tongue, is very smooth, as the papillæ have disappeared. The fissure thus described differs from that reported by Butlin.

Ulcers may also appear as fissures, which, in the early stages, may be entirely overlooked, resulting from infection taking place either from the sputum or through the blood or lymph streams. They are most frequently found on the sides or tip of tongue (Fig. VIII), although they may also appear upon the dorsum and at the corner of the mouth. They may or may not be found in a fissure of a previously fissured tongue, and, although the edges are usually soft, they may be indurated. Butlin describes them as having indurated edges. When the fissure is separated the granulations appear as in a tuberculous ulcer of the surface, but with fewer vascular granulations, and with minute tubercles over the whole surface, interspersed with light reddish areas. The edges slough slowly as a rule, from caseation of the tubercles, leaving ragged edges. These fissures may extend into the muscular substance of the tongue and yet show no surface extension, but not so at the corner of the mouth. Here surface extension similar to ulcers beginning on the surface of the tongue, cheeks, or gums may be shown. Ulcers appearing upon the lips, cheeks, surface, edge or tip of tongue, usually exhibit a reddish base covered with granulation tissue, upon which small whitish tubercles seem to have been sown. The edges are irregular, or what was first termed by La Bolene as mouse-eaten, soft, although they may show some induration.

Some authors speak of the sharp-cut appearance of the edge. This is very seldom to be found, although the writer has seen two cases in which the edges could be said to be sharply outlined. The tissues immediately surrounding the ulcer are pale and flabby in appearance, and may show many tubercles scattered over the surface. The tendency is to spread laterally but not deeply, but some cases also show destruction of muscular tissue.

Ulcers of the gums begin at the gingival margin, usually around a tooth having an artificial crown, one having a calculus upon the root, or around a much decayed and broken down tooth. (Cases 2, 5 and 16.) This continues into the mucosa and periosteum, involving the alveolar process, which, in some cases, breaks down slowly, while in others so rapidly that the whole socket becomes involved, causing the teeth to loosen to such an extent as to become not only a marked annoyance but also very painful, so that removal is necessitated. The process of destruction continues, involving usually the socket of the tooth upon either side, until the angle of the jaw is reached, or a vacant place where a tooth has been extracted. In the first, the palate may become involved, while in the latter the destruction may not jump the space.

Other parts of the mouth may be involved; more frequently the gums of the other jaw, cheeks, lips, and floor of the mouth, in the order named (Cases 2 and 16). The gums of the opposing jaw are affected possibly from direct transference of infection by the tongue or food. In the case of other structures named, it is by direct continuity of the mucous membrane.

Bower's case caused exfoliation of several teeth, and several sequestræ were removed. This patient complained of a great deal of pain referred to the ears; probably either through the auriculotemporal or Jacobson's nerve, as the reporter does not state in what part of the ear the patient located his pain. Both sides of mandible were involved.

Chamberlin reports as cured by local applications the case of a girl, fifteen years of age, showing primary involvement of the buccal surface of the gums of the lower jaw.

Stephen Paget also reports an interesting case of ulcer of the gums which spread to the lip. This patient was a woman, twenty-six years of age, who had pulmonary tuberculosis. The ulcers had been present for three years. They were thoroughly curetted, but returned.

In the case reported by Coolidge, the gums were affected back of the anterior teeth, and ulcer healed after use of electric cautery. Coolidge suggests that infection of the nasal cavity may take place in this way, while Grünwald believed that his case of tuberculous ulcer of the hard palate was infected from the nose.

Walter reports case of male, aged thirty-eight years, in which, as he expresses it, perforation of hard palate exposing maxillary sinus followed the extraction of a tooth. The wall of ulcerated tract was covered with miliary tubercles. Patient died of pulmonary tuberculosis.

Lenzmann saw a woman, aged twenty-six years, with tuberculous ulceration of gums of lower jaw, which spread to cheek and lower lip.

Butlin makes a classification of tuberculous papillomata, which is nothing more than an exaggeration of a fissured ulcer in which the edges seem to hypertrophy. The writer has never seen a case involving the tongue, and only one, a case of Lockard's, with tuberculosis of the soft palate and lower jaw, having a fungoid appearance of the anterior pillar and of the mucosa of cheek. This man was twenty-three years old, and had extensive pulmonary and laryngeal involvement. He died within a few weeks. This case appeared, on first view, like lupus, but was secondary to lung involvement.

The soft palate is involved many times when no other oral structure is affected, mainly by extension from pharyngeal and tonsillar tuberculosis, and usually very late in the disease. Ulceration is almost always very superficial, covered with a grayish film, with the edges poorly defined. It spreads rapidly, covering the whole palate with tubercles in from twenty-four to forty-eight hours.

One of Lockard's cases, seen by the writer in consultation, presented a perfectly clear palate at the time of treatment, but in forty-eight hours it was completely covered with tubercles.

Grocler saw eight cases of perforation of the soft palate: two primary cases, and six secondary associated ulcerations of gums, lips, tongue, tonsils and pharynx. He concludes that the soft palate is affected more frequently than the hard, while syphilis affects the hard, and that the borders of the specific ulcers are more sharply defined.

However, the hard palate may be affected with loss of tissue and go through the same course as the gums, the tubercle first appearing on the mucous membrane. These tubercles break down and form an ulcer, which continues into the periosteal covering and destroys the blood vessels. In this way nutrition is cut off from the part, and sloughing and necrosis take place.

The cases of Coolidge, Walter, Grünwald, and case 2 of the writer's, are examples of ulceration of the hard palate.

Tuberculosis of the salivary glands is very rare. Fioravanti has recently reported one parotid case and the records of thirteen others. Although the writer doubts their being primary in most cases, infection may take place through the blood or lymph streams; also through the ducts of these glands, as it is quite probable that other infections gain their entrance in this way, the most common of these being epidemic parotitis. However, the fact that the lymph glands in the region of the submaxillary salivary glands are frequently involved, as are also those draining the pharynx and tonsil which are immediately posterior and inferior to the parotid, it can well be imagined that infection may be either direct or hematogenous.

All cases reported show a mixed infection, which may mean that the soil is prepared by previous infection. The writer believes this to be the case, or that possibly a second infection may have become engrafted upon a quiescent tubercle.

The tubercle goes on to caseation, and later to abscess. It may discharge through the duct, although, as a rule, it is necessary to open it. The gland destruction may be partial or complete. In Gilmer's case of sublingual gland it was complete, while in the writer's, a double parotid, it was only partial in each gland.

Pain is usually severe, as the abscesses are walled off from each other by the septa of the gland, and a new abscess forms after one is opened. This may be stopped by opening each pocket, but this is not an easy matter, as, in the case of the parotid, care must be taken not to wound the facial nerve; in case of the submaxillary, the hypoglossal.

The writer's case shows that the nervous tissue is not affected by the process any more than the fibrous tissue septa, for although the pus completely surrounded both nerves, there was only a slight affection of the right nerve, due, the writer believes, to contraction of scar tissue, as symptoms did not appear until after healing had commenced.

Until within the last twenty years lupus was considered as a disease separate and distinct from tuberculosis. Even as late as 1896 there was controversy over the relationship of lupus and tuberculosis, but at present we know that the tubercle bacillus can be found in lupoid tissue.

There seems to be a difference in the mode of infection, or possibly there is a difference in the organism which is not shown either in the tissues or in our present laboratory methods by cultural characteristics. The number of bacilli present is always small. Lupus has little effect on general nutrition and as a rule causes little pain.

Girls, before or about the age of puberty, seem to be most frequently affected. The skin lesions are encountered more often than those of the mucous membrane, hence these cases usually fall into the hands of the dermatologist.

Hollander suggests that any grade of transition may exist, from the lupoid ulcer with its hypertrophic folds and slow growth, to the ragged tuberculous ulcer, rapidly destroying tissue; and that they may be found side by side in the larynx and in the mouth.

Lupus in the mouth, either primary or secondary, is rare. Langie says: "If secondary lupus is rare, primary lupus is among the rarest of the rare."

Only one case of lupus of the mucous membrane has come under the writer's observation, one involving the nasal mucosa. A number of cases of lupus have been reported in this country. Among them is that of Asch, which was also later reported by E. Mayer. This concerned a patient who had involvement of the soft palate, anterior pillars, tonsil and pharynx.

Interesting also are the two cases of Knight, one a young girl, fourteen years of age, in whom the nose was first attacked and later the lower lip, upper gums, cheek, palate, uvula and nasal septum. The second patient, aged twenty-seven years, showed ulceration of the hard and soft palate and pharynx, with cicatricial bands extending from the tongue to the lateral walls of the pharynx, and from base of tongue to the epiglottis.

Asch's table of ages, although he does not give sex, is also interesting compared with table of ages in tuberculosis of the mouth, and is as follows:

4 cases beginning before 10 years of age.
6 cases beginning between 10 and 15 years of age.
8 cases beginning between 15 and 20 years of age.
3 cases beginning between 20 and 30 years of age.
1 case beginning between 30 and 40 years of age.
1 case beginning at 40 years.

Out of one hundred and sixty-eight cases collected by the writer, in which age and sex are given, there were one hundred and forty-five males and twenty-three females. The age varies from five to eighty years, with an average of thirty-six years.

The diagnosis of primary tuberculosis of the mouth presents some difficulties. It must first be differentiated from syphilis, which can be done by first differentiating from the primary sore. This is a sharply defined punched-out appearing ulcer, with indurated base, and shows no tubercles. In the case of the secondary manifestations, they are usually multiple; while primary tuberculous lesions, unless of some weeks' standing, would be simple, and the secondaries would have disappeared. The gummata can be differentiated by the lack of tubercles around the edges. Scraping the ulcer, or sectioning the tissue from edge, finding the tubercle or spirochetæ, or at least either the von Pirquet or the Wassermann reactions, will decide.

In differentiating epithelioma from tuberculosis, we observe the indurated edges of epithelioma and the generally soft edges of tuberculous ulcer; the depressed base of epithelioma and presence of many small tubercles in tuberculosis and the age of the patient, of value only when young. Any reaction proving the lesion to be tuberculous is not sufficient, as we may have tubercle engrafted upon epithelioma. Microscopic examination is the only absolute and reliable test.

In secondary disease we may consider against all symptoms in other diseases the history of cough, expectoration, tubercle bacilli in the sputum, loss of weight, hemoptysis, etc., before resorting to other means.

It must be borne in mind, however, that symptoms of pulmonary tuberculosis will not exclude syphilis; and we must not give the therapeutic test for syphilis to patients with pulmonary or any other tuberculous lesion, if it is possible to avoid it, or unless the Wassermann reaction shows that syphilis is also present.

Della Vedova reports twenty-three cases operated upon by Volkman, Bull, and other eminent surgeons under mistaken diagnosis; as was also a case of Shepard. The interference with general health may be found either in cases of epithelioma or tuberculosis.

The first authentic case of lupus of the oral cavity on record was reported by Travers, in 1827, although Louis reported four cases of tuberculosis found at postmortem in 1825; while the first case of ulcer of the tongue was reported by Thomae in a thesis dated 1829, and Rayer in 1835, a case of perforation of palate. However, Schoelermann refers to Fabricus Hildanus, who reported a case in 1646 which he believed to be one of oral tuberculosis.

REPORTS OF CASES.

It would be out of place even to attempt to detail the cases reported, the references having multiplied to such an extent in the last few years. Hence, only such cases as show special features of interest have been given prominence; the remainder are shown only in the tables.

Case 1.—Seen at the Jewish Consumptives' Relief Society. Male, student, age twenty-two years. Pulmonary tuberculosis for two years; laryngeal tuberculosis for three months; developed ulceration in the region of the right lower third molar, causing sloughing of the gum and caries of the jaw. Tubercles in tissue surrounding ulcer. Tubercle bacilli found on scraping ulcer.

Case 2.—D. K., physician, thirty-four years of age. Pulmonary tuberculosis for four years; slight laryngeal involvement for six months; developed ulcer on lingual surface of right lower first bicuspid and second bicuspid, first, second and third molars, with ulceration of the lower lip and floor of mouth under tongue. This patient also developed ulceration of the gum in the region of the right upper first molar, which had been absent for several years. Another ulcer in the region of the left upper third molar, which involved the tuberosity. Patient died three months after first involvement of the jaw.

Case 3.—J. F. S., machinist, age thirty-four years. Patient was referred by his dentist, Dr. M. G. Snyder. Tuberculosis for one and a half years; pulmonary, but no laryngeal involvement. After destruction of the pulp of a lower first molar, glands under jaw became swollen, and were opened by the writer three months later. Pus contained tubercle bacilli. Patient developed tuberculosis of the left testicle three and a half years later. At present he is in good health.

Case 4.—H. H. S., male, age thirty years, clerk. Was referred by Dr. C. A. Graham. Gave history of pulmonary involvement for two and a half years; laryngeal involvement for eleven months. First complained of tenderness of tip of tongue, which he attributed to its coming in contact with calculus on lingual surface of anterior inferior teeth. This appeared as a swollen, reddened papilla, which broke down into an ulcer about the size of a pin head. Ulcer continued to enlarge until it reached the size of a navy bean, when the electric cautery was applied to it. Healing took place within a few days. The pulmonary and laryngeal condition progressed, and, although the teeth were kept free from calculus, an ulcer developed in the edge of the scar one year later. This second ulcer was destroyed with the electric cautery. It cicatrized and remained so until death, a few months later.

Case 5.—I. H. E., traveling salesman, aged twenty-eight years. Referred by Dr. G. W. Holden, on account of nasal condition. Pulmonary tuberculosis, two years. One year later he complained of irritation around roots of broken down upper right first molar, which continued to spread along the exterior, involving the gums around second and third molars; later also involved the palatal surface. Scrapings showed tubercle bacilli. Teeth were extracted; ulcer cauterized with electric cautery, and although this was repeated several times, it was without success. Ulcer was kept within these limits for about three years, when patient died of brain embolus.

Case 6.—A. M. B., cigar maker, age twenty-nine years. Referred by Dr. F. A. Greedy on account of ulceration of alveolus and gums between upper left central incisor and cuspid, lateral being absent, and about five centimeters from gum margin. Ulcerated surface showed tubercles, and tubercles were also seen in surrounding tissues. This patient also had involvement of the left maxillary sinus, which may possibly have been tuberculous. He had been a sufferer from pulmonary tuberculosis for eight years. The ulcer healed after numerous cauterizations with trichloracetic acid, and remained so until death from pulmonary tuberculosis, two years later.

Case 7.—G. R., barber, age thirty-nine years. Consulted writer for laryngeal tuberculosis. Pulmonary tuberculosis, one and a half years; laryngeal involvement, about one month, the latter showing rapid progress, for at the time of examination, vocal cords, ventricular bands, interarytenoid sulcus, and epiglottis, all showed marked infiltration. One month later patient noticed what he called a blister on the dorsum of the tongue, and, when called to my attention, showed a small, slit-like opening in center, with ulcerated base, showing overhanging edges. Ulcer showed no tendency to heal and no tendency to spread. Patient died six weeks later.

Case 8.—S. R., merchant, age thirty-nine years. Was referred by his dentist, Dr. M. H. Barrin, on account of involvement of socket of the left lower first bicuspid. Pulmonary involvement for five years. On examination pus was found oozing from the socket, with ulceration showing tubercles of the surrounding gums. Scraping showed tubercle bacilli. Patient was lost sight of after first treatment.

Case 9.—J. R., tailor, age thirty-four years. Was referred by Dr. Philip Hillkowitz, on account of ulceration of the right border and inferior surface of the tongue. Pulmonary involvement of four years' standing. Ulcer cauterized with electric cautery several times with no appreciable benefit, and it continued to spread. Patient died of tuberculosis three months after ulcer was first seen.

Case 10.—N. H., male, nurse, age forty years. Referred by Dr. Fish, from the Jewish Consumptives' Relief Society, on account of involvement of the left side of the lower jaw in the region of the second bicuspid. Pulmonary involvement for three years. Gum ulcerated, and necrosis with the formation of small sequestrum. Removed by operation, parts cauterized with the electric cautery. This case had been operated previously, but disease continued to spread. Tubercle bacilli found in material curetted from ulcer. Patient alive and in good health.

Case 11.—Patient from Jewish Consumptives' Relief Society, male, aged forty years. Referred by Dr. C. D. Spivak. Pulmonary involvement for two years. Fissured ulcer of tip of tongue, cauterized with trichloracetic acid. This patient was seen by the author only three times, so that final result cannot be recorded.

Case 12.—H. A., patient at National Jewish Hospital for Consumptives, age twenty-four years. Pulmonary involvement of two years' duration. Showed swelling of left parotid gland, which later suppurated, and on opening pus was found to contain only the diplococci resembling those found in epidemic parotitis. A second pocket of pus, opened a few days later, showed tubercle bacilli as well as diplococci. The left gland suppurated five weeks later, and on opening, showed mixed infection, tubercle bacilli and diplococci. Case progressed slowly, each side showing several pockets of pus; right had entirely healed when patient was last seen, and gland still showed some function, although the amount of salivary secretion was small. Left side still showed some secretion when patient was last heard from.

Case 13.—Young man, age twenty years. Seen on my service at the Denver City and County Hospital. Developed an abscess of the right upper first molar, which was manifested by a large swelling of the cheek, and a discharge of pus through Stenson's duct. Apparently abscess had eroded wall of duct. Pus contained numerous caseous masses, and patient was suffering from pulmonary tuberculosis of several months' standing.

Case 14.—Miss R., school teacher, age forty-two years. Referred by Dr. J. R. Arneill, on account of her laryngeal condition. Larynx showed infiltration of vocal cords, ventricular bands, and arytenoepiglottidean folds, with ulceration of the interarytenoid sulcus and left ventricular band. Three weeks later the patient called attention to a small "blister" upon the dorsum of the tongue, which, on examination, showed a fissured opening in the center. The condition in this case was very similar to that in case 7. Patient died one week after ulcer appeared.

Case 15.—Mr. C. B., age twenty-two years. Referred by Dr. J. H. McKay, on account of laryngeal tuberculosis. Patient was also suffering from acute pulmonary tuberculosis; history of syphilitic infection two years previous. On examination larynx showed infiltration and ulceration of entire surface. There was also ulceration of the left side of the pharynx, posterior pillar and tonsil; palate later became involved. Death six weeks after first visit.

Case 16.—D. S. R., age twenty-six years. Referred by Dr. L. H. Schultz. Pulmonary tuberculosis, one and a half years; laryngeal tuberculosis, four months. Gums upon the left upper jaw, on both palatal and buccal surfaces, are ulcerated from the second bicuspid to and including the tuberosity. On the right upper jaw, ulceration is found on the gum on the buccal surface of the first molar; another ulcer is found on the lingual surface of the lower jaw on the left side opposite first molar. Tubercle bacilli found on scraping.

Case 17.—Japanese, age thirty-six years. Seen in consultation with Dr. A. L. Bennett. On examination a tumor-like mass was found in the middle of the dorsum of the tongue the size of a hickory nut, which was quite hard, but showed slight evidence of fluctuation. Upon opening about a dram of caseous pus was evacuated, which was not examined. Abscess healed without complication. No evidence of tuberculosis in this patient, but brother had died of tuberculosis.

The following tables show 534 cases with 661 lesions, distributed as follows:

Tonsil	48
Pharynx	51
Palate	97
Upper jaw	48
Lower jaw	36
Cheeks	16
Tongue	277
Lips	48
Location not specified	40

	Author.	Cases		Date	Lips	Cheek	U. Jaw	L. Jaw	Tongue	Tonsil	Pharynx	Palate	Mouth	PUBLICATION.
		*P.	*S.											
1	Delevan (personal)	3	4	1887		1P			1-P 1S	1S	1S	1P		New York Med. Jour., XLV, 536-541.
	From other sources		109						51	4	24	8	22	
2	Stewart		1	1886					1					Med. News, Philadelphia, May 29, 1886.
3	Theisen, C. F.		2	1899						1	2	1		Jour. Amer. Med. Asso., August 12.
4	Lubinski		2	1887						2		1		Brit. Med. Jour., 1887, II, 456.
5	De Blois		2	1884						2		1S 1P		New York Med. Jour., XL, 505-507.
6	Ragoneau		1	1891								1		Rev. de Laryngologie, No. 20.
7	Routier, A.		1	1878	1		1					1		France Med., Paris, XXVI, 113.
8	Battle		1	1890								1		Jour. Laryn. and Rhin., January.
9	Von Zeimsen			1878								1		Cyclopedia, VI, 986.
0	Butlin and Spencer		2	1900	1				2					Diseases of Tongue.
1	MacIntyre		1	1891					1					Jour. Laryn. and Rhin., April 5.
2	Barth		1	1880					1					Societe Med. des Hop., November 29.
				1887										
3	Bucquoy				1				1					Quoted by Baudon.
4	Gosselin and Fano								2					Quoted by De Brun, Du Bois Noir.
5	Lennox Browne	1	2	1881			1		1		1	1		Cong. Internat. de Laryngol. 1880, Milan, 1882, I, 104-112.
6	Kronheim		2						2					Langenbeck's Schrn. Archiv f. Klin. Chir., Suppl., Band 2, XXI.
7	Bosworth		1	1883					1					Trans. Amer. Laryn. Asso., 1881, III, 65-77.
8	Duplay		1						1					Quoted by Euteneuer.
9	Fournier	2							2					Quoted by Euteneuer.

*P. Primary. S. Secondary.

.	Author.	Cases		Date	Lips	Cheek	U. Jaw	L. Jaw	Tongue	Tonsil	Pharynx	Palate	Mouth	PUBLICATION.
		*P.	*S.											
0	Uchermann			1884								1		Norsk Mag. f. Laegendersk, Kerstiania, XIV.
1	Abercrombie and Gay		3	1886						3		3		Brit. Med. Jour., London, II, 923.
2	Kidd, Percy		11	1886							7	4		Discussion No. 21, Ibid.
3	Feurer, G.	2	1	1886				1	3					Switzerland Correspondence, Brit. Med. Jour., II.
4	Chamberlin, C. W.	2	1	1881				1			1			Proc. Conn. State Med. Soc.
5	Abrahams, P. S.	1		1885						1	1			Trans. Acad. Med., Ireland, Dublin, III, 358.
6	Stchastny, A.		5	1889						5				Annals de l'Inst. Pasteur, Paris, III, 224.
7	Stonham			1889					1					Westminister Hospital.
8	Wingrave, V. H. W.		1	1892					1					Brit. Med. Jour., II.
9	Ducrot, L.	1	2	1879					1			2		Etude sur la tuberculose de la bouche, etc.
0	Browne, L., and Grant, Dundas			1881			1		1			1		Archives of Laryngology, January.
1	Babes		1	1883	1									Bull. Soc. Anat. de Paris, LVIII, 341.
2	Eichoff, J.		1	1881	1				1			1H		Deutsche med. Woch., Berlin, VIII, 418.
3	Boeckel, E.		1	1872					1					Gaz. med. de Strasb., XXXII, 8.
				1873										
4	Finger, E.		3	1883	2		1	1	1			1		Med. chir. Centralb., Wien, XX, 447.
				1885										
5	Hansemann, D.		4	1886	3	2			1			1H		Arch. f. path. Anat., etc., Berlin, CIII.
6	Grocler	2	6	1901			1	2	2	2		8		Bull. de Laryngol., etc., March, 30.
7	Jullard fils		1	1875		1			1		1			Bull. Soc. Med. de la Suisse Rom., Lausanne, IV, 104
8	Le Dentu, A.		1	1876	1	1		1				1		Assoc. franc. jour. l'arance d. sc. Compt. rend. 187 b. Paris, 1877, V, 884.

Quenu			1878								1		Bull. Soc. Clin. de Paris, II, 194.
Reclus, P.		2	1877	1	1	1		10			1		Gaz. hebd. de Med., Paris, 2s, XXIV, 691.
Reverdin, A.		1	1872					1					Mem. Soc. de Med. de Strasb., IX, 173.
Schliferowitsch, P.			1887	2				6				4	Deutsche Ztschr. f. Chir., Leipzig, XXVI, 527.
Fischer		6						6					Quoted by Della Vedova.
Trelat, U.		1	1870					1					Arch. gen. de Med., Paris, I, 35.
Baudon, T.		1	1874					1					Paris, Des ulcerations tuberculeuses de langue et de l'orifice.
Boucheux, A.	1	7	1870	1	1			5	3	1	2	1	Paris, Des ulceres tuberculeux de la bouche et de la langue.
Euteneuer, E.		1	1872					1					Bonn, Ueber Tub. der Zunge.
Jores, T.			1885					1					Würzburg, Ueber das tub. Zungengeschwür.
Lambert, F.		5	1876					5					Paris, Des ulcerations de la langue dans le cours, etc.
Nolden, G.		3	1888					3					Bonn, Das tuberkulose Zungengeschwür.
Ponzergues, L.	2	4	1873					5		1	1		Paris, De l'ulcere tuberculeux de la langue.
Reimann, A.		8	1880					8					Breslau, Ueber tub. Geschwüre der Zunge.
Schnidt, O.		5	1883					5					Halle a. S., Ueber tub. Ges. des Zunge.
Schoelermann, C.		2	1861					2					Kiliæ, De ulcre lingual tub.
Thomae, F. J.		1	1839					1					Berolini, De induratione scroph lingual et genarm, etc.
Babinsky, B.		1	1889			1 G.		1					Verhandl. d. Berl. med. Gesellsch. (1889), 1890, XX. 90.
			1890										
Barker, A. E.		1	1883					1					Trans. Path. Soc., London, XXXV, 169.
Hopstein	1	11						2					Quoted by Harsha.
Wagner, B.			1865					1					Arch. d. Heilk., VI, 470.
Bowlby, A. A.		2	1883					1			1		Trans. Path. Soc., London, XXXV, 159.
			1884										
Boyd, S.	1		1882					1					Trans. Path. Soc., London, XXXIV, 134.
			1883										
Brochin		1	1869					1					Gaz. d. Hop., Paris, XLIII, 151.

*P. Primary. S. Secondary. G. Gums.

Author.	Cases *P.	Cases *S.	Date	Lips	Cheek	U. Jaw	L. Jaw	Tongue	Tonsil	Pharynx	Palate	Mouth	PUBLICATION.
De Brun, Du Bois, Noir.	1		1882 1883					1					Bull. Soc. Clin. de Paris, VI, 276.
Schott		1						1					Quoted by Chvostek.
Charlier		1	1891					1					J. d. Mal. Cutan. et Syph., Paris, III.
Chvostek		1	1884					1					Algem. Wien. med. Ztg., XXIX, 209-224, 234-60-89,79.
Dowd, C. N.		1	1890					1					Proc. New York Path. Soc., 1890-91.
Dugnet		1	1885					1					Ann. Med. Chir. franc. et etrang. Paris, I, 185-495.
Fercol		1	1872					1					Union Med., Paris, 3s, XIV, 716-29.
Fox, S. A.		1	1889					1				1	Gaillard's M. J., New York, XLVII, 518.
Gade, F. G.		1	1884					1					Norsk Mag. f. Laegerindensk, Christiania, XIV, 95.
Godlee, R. J.		3	1883					3					Trans. Path. Soc., London, XXXV, 184.
Hadden, W. B.			1882					1					Trans. Path. Soc., London, XXXIV, 135.
Heurtaux		1	1882					1					Bull. Soc. Anat. de Nantes, Paris, VI, 101.
Jackson, V.			1886					1 tip					Lancet, London, II, 444.
Jessett, F. B.		1	1883					1					Trans. Path. Soc., London, XXXV, 162.
König, C. F. W.		1	1857					1					Org. f. d. ges. Heilk., Berlin, VI, 101.
Korte, W.		1	1876					1					Deutsche Ztschr. f. Chir., VI, 442.
Kuessner, B.		5	1876	1				2	1		3		Deutsche med. Woch., VII, 277.
Laboulbene, H.		1	1874					1					Courier Med., Paris, XXIV, 323.
Lancereaux, E.		1	1874					1					Bull. Soc. Med. d. Hop. de Paris, 2s, 8, 298.
Laurent			1884					1	1		1		Lyons Med., XIV, 513.
Leger, H.		1	1887					1					Ann. de Mal. de l'oreille, du larynx, etc., Paris, III, 35.

84	Leloir, H.	....	1	1878	......	......	......	......	1	......	......	......	...	Bull. Soc. Anat. de Paris, LIII, 542.
85	Albert	....	1	1877	......	......	......	......	1	......	......	......	...	Wiener Med., Presse.
86	Mariani, J. M.	....	1	1889	......	......	......	......	1	......	......	......	...	Rev. de Med. cirug. fract., Madrid, XXV, 13.
87	Millard	....	1	1878	......	......	......	......	1	......	......	......	...	Union Med., Paris, 3s, XXV, 734.
88	Morton, C. A.	....	1	1892	......	......	......	......	1	......	......	......	...	Lancet, London, I, 88.
89	Deliguy	....	1	1878	......	......	......	......	1	......	......	......	...	Union Med., No. 62.
90	Nedopil, M.	4	1	1877	......	......	......	......	5	......	......	......	...	Archiv. für klinische Chirurgie, Band XX.
91	Orlow, L. W.	....	1	1887	......	......	......	......	1	......	......	......	...	Jour. Laryn. and Rhin., February, 1888.
92	Bower	....	1	......	......	......	......	1	......	......	......	......	...	Quoted by Bernheim.
93	Poncet, A.	....	....	1873	......	......	......	......	1	......	......	......	...	Lyon Med., 1873, XIII, 33. Ibid, 1888, LVIII.
		....	....	1888	......	......	......	......	......	......	......	......	...	
94	Ranke, H. R.	....	....	1872	......	......	......	......	1	......	......	......	...	Deutsche Ztschr. f. Chir., VII, 36.
		....	....	1876	......	......	......	......	......	......	......	......	...	
95	Raynaud, M.	....	....	1874	1	......	......	......	1	......	......	......	...	Bull. Soc. Med. d. Hop. de Paris, XI, 120.
96	Sendziak	....	1	1889	......	......	......	1	1	......	......	......	...	Jour. Laryn., Rhin. and Otol., June.
97	Thorner, Max	....	....	1898	......	......	......	......	1	......	......	......	...	Jour. Amer. Med. Asso., Vol. 1.
98	Senn, N.	....	....	1892	......	......	......	......	1	......	......	......	...	Internat. Med. Mag., Philadelphia, I, 276.
99	Symonds, C. J.	....	....	1883	1	......	......	......	1	......	......	......	...	Trans. Path. Soc., London, XXXV, 166.
00	Kyle, D. Braden	....	....	1898	......	......	......	......	1	1	......	......	...	Jour. Amer. Med. Asso., Vol. 1.
01	Thompson, H. A.	....	1	1888	......	......	......	......	1	......	......	......	...	Brit. Med. Jour., London, II, 664.
02	Czerny	....	....	1897	......	......	......	8	......	......	......	......	...	Centralb. f. Chir., XVIII, December 12.
03	Shepard	....	1	1889	......	......	......	......	1	......	......	......	...	Montreal Med. Chir. Soc., France, January 22.
04	Duval, C. W.	....	1	......	......	......	......	1	......	......	......	......	...	Trans. 6th Inter. Cong. on Tuber., Vol. IV, Part II.
05	Vallin	....	1	1876	......	......	......	......	......	......	......	1	...	Bull. et Mem. Soc. Med. d. Hop. de Paris, 2s, XIII, 169.
		....	....	1877	......	......	......	......	......	......	......	......	...	
06	Wagner, E.	....	....	1862	......	......	......	......	......	1	......	1	...	Arch. d. Heilk., Leipzig, III, 571.
07	Bull	2	5	1889	......	......	......	......	1	......	......	......	...	Med. Record, January 19.
08	Kosinski	....	1	1875	......	......	......	......	1	......	......	......	...	Paweetnik Tow Wais, IV.
09	Delrus	....	....	1875	......	......	......	......	......	......	......	......	1	Virchow-Hirsch, II, 385.
10	Finger	....	1	1883	......	......	......	......	......	......	......	......	1	Algem. Wiener med. Zeit., No. 5.

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*P. Primary. S. Secondary.

o.	Author.	Cases		Date	Lips	Cheek	U. Jaw	L. Jaw	Tongue	Tonsil	Pharynx	Palate	Mouth	PUBLICATION.
		*P.	*S.											
11	Albrecht		1						1					Pathologie und Therapie der Lungenschwindsuch Wien, 1908.
12	Weber, O.													Pitha, Billroth Chirurgie III, I.
13	Bamberger								1					Virchow's Spec. Path. u Ther., Ed. 6, I.
14	Barling, C.	7	2	1891		1	1			1	1	6		Lancet, I, 1423.
15	Bean, C. E.		2	1889					2		1			Trans. Am. Laryn. Asso., XI, 113-16.
				1890										
16	Burnheim, S.		1	1900				1	1					Dental Cosmos, 1901, Vol. XLIII.
17	Paget, James			1858					1					Med. Times and Gaz.
18	Fleming			1850					1					Dublin Quarterly Jour., August, No. XIV.
19	Moeller		1	1910				1						Muench. med. Woch., No. 2.
20	Terenkoczy		1	1889					1					Abst. Jour. Laryn., Rhin. and Otol., July, 1889.
21	Valude		1	1888									1	Abst. Jour. Laryn., Rhin. and Otol., London, Dece ber.
22	Gleitsman	1		1888					1	1		1		Academy of Med., November 27.
23	Dunn, J.	1		1904										Virginia Med. Semi-Monthly, Richmond, IX, 486.
				1905										
24	Jaruntonsky		1	1895				1						Abst. Jour. Laryn., Rhin. and Otol., July.
25	Semon, Felix		1	1895						1		18		Jour. Laryn., Rhin. and Otol., December.
26	Cameron, H.		2	1896					2					Glasgow Med. Jour., August, 96.
27	Harland, W. G. B.		2	1903	1				1			1		Proceedings Phila. Co. Med. Soc., n. s., V, 192.
28	Blumenfeld				1	1		1						Quoted by Lenzmann.
29	Lenzmann		1	1898	1	1		1						Münchener med. Woch., June 21.

30	Horne, Jobson		1	1897						1	1	1		Laryn. Soc. of London. Reported in Jour. Laryn Rhin. and Otol.
31	Paget, Stephen		1	1890	1		1 G.							Abs. from Lancet, March 22, 1890, in Jour. of Laryn and Rhin.
32	Michelson, P.		2	1890					2			1		Ztschr. f. klin. Med,. Berlin, XVII.
33	Lord			1893	1	1								
34	Schuchardt			1889	1	1								Deut. med. Woch., XV, 1075.
35	Volkmann	2			1				2					Quoted by Armstrong.
36	Armstrong, G. E.	1		1910	1									Annals of Surg., April.
37	Rethi, L.		1	1893								1		Wien. med. Presse., 721.
38	Louis			1825									4	Recherches sur la Phthisie, Paris, Bosworth.
39	Willigk	2		1856				2						Prager Vierteljahrschrift, XIII, Part II, 10.
40	Thibierge, G.		1	1897	1									Ann. de dermat et syph., Paris, 3s, VII, 286.
41	Gazagne		1	1872						1		1		These de Paris, 1872.
42	Buzenet	1		1858	1									These de Paris. Referred to by Ducrot.
43	Laveran												1	Referred to by Hansemann.
44	Rocord								1 U					Referred to by Hansemann.
45	Frankel, A.		6											Referred to by Hansemann.
46	Langie			1890									1	Przegla Lekarski keakow. Quoted by Mayer.
47	Travers			1829									1	Quoted by Langie, who was quoted by E. Mayer.
48	Mayer, E.			1897								1		Trans. Am. Laryn. Assn.
49	Wylie, A., and Wingrave, W.			1906					1					Med. Press. and Circular, London, N. S., LXXXII, 639
50	Billroth		2						2					Quoted by Bowlby.
51	Campbell, J. T.		1	1907					1					Laryngoscope, XVII, 233.
52	Della Vedova†			1907					23					Policlin, Roma, XIV, Sez. Chir.
53	Tixer and Barjon			1907	1									Lyon Med., CVIII, 782.
54	Augier		1	1907	1									Jour. d. scien. med. de Lille, I, 546.
55	Richardson	1		1898					1					Trans. Am. Med. Asso., Vol. I, 479.
56	Cook, George W.	5		1899				5						Dental Review, February, 1899.

*P. Primary. S. Secondary. G. Gums.

†Collected from literature. Operated on mistaken diagnosis.

o.	Author.	Cases *P.	Cases *S.	Date	Lips	Cheek	U. Jaw	L. Jaw	Tongue	Tonsil	Pharynx	Palate	Mouth	PUBLICATION.
57	Webber, A.			1907					1					München. med. Wochnschr., LIV, 1785.
58	Knight	3		1881		1	1		1		2	2		Trans. Am. Laryn.
59	Hollander			1906	12		30		1					Berl. klin. Woch., June 4.
60	Levy, Robert		8	1908			2	1	1	3	1			Denver Medical Times, XXVII, 197.
61	Sharp, J. C.			1908					1 tip	1	1	1		Amer. Med., Burlington, 385.
62	Lockard, L. B.		14	1909	1	1		1	2	7	2	12		Tuberculosis of Nose and Throat; also personal co munications.
63	Grünwald	1	3		2						1	1H 1S		Atlas Mouth, Pharynx and Nose.
64	Leshure, John	1			1				1					Abstract.
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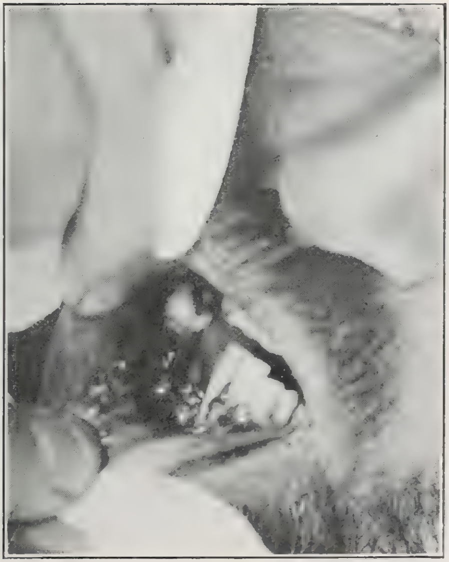

FIGURE I.

Case 2. Tuberculosis of lower jaw. The superior maxilla was affected on both sides a few weeks before death.*

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*The illustrations are all taken from cases of the author, although Figures 1, 2, 8, 9, 13, 14, and 15 were loaned to Dr. L. B. Lockard and published in his book, "Tuberculosis of the Nose and Throat."

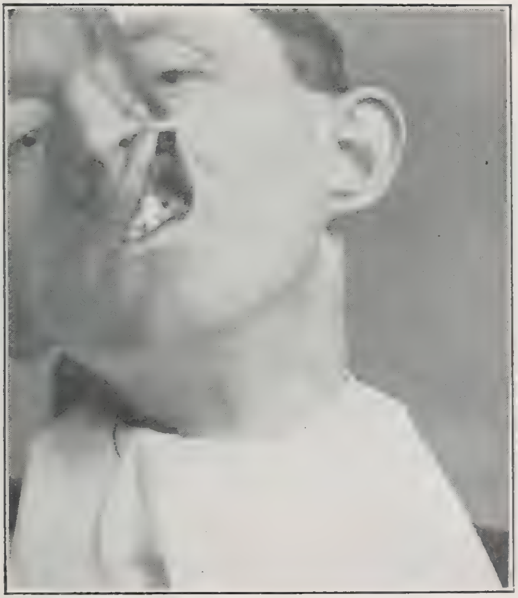

FIGURE II.

Case 6. Tuberculous ulcer following abscess of left superior lateral incisor.

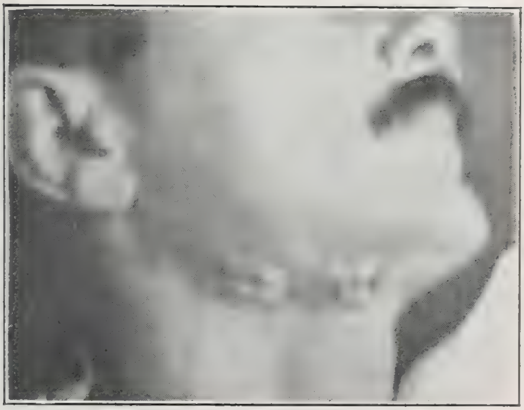

FIGURE III.

Case 3. Submaxillary lymphatics infected from lower first molar.

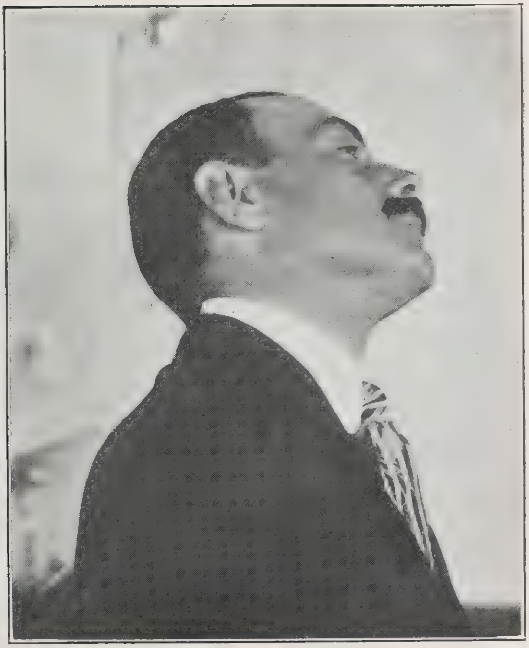

FIGURE IV.

Case 3. Same patient three and one-half years later.

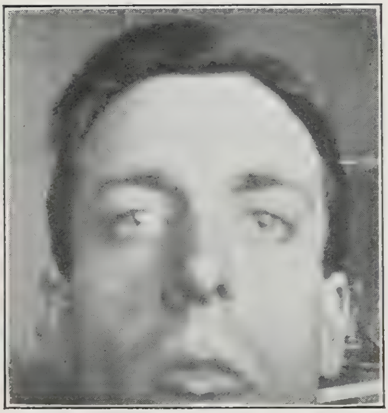

FIGURE V.

Case 4. Tuberculous ulcer of tongue.

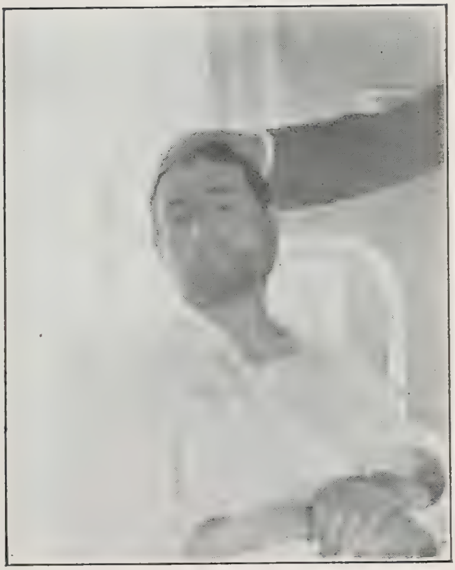

FIGURE VI.

Case 12. Tuberculosis of left parotid gland.

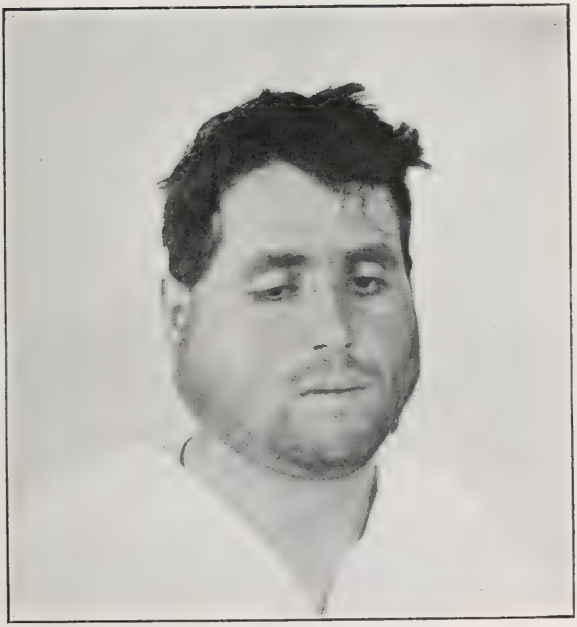

FIGURE VII.

Case 12. Tuberculosis of right parotid gland.

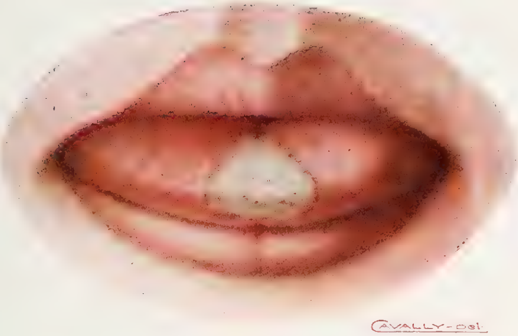

FIGURE VIII.

Case 4. Tuberculosis of tongue. Patient, male, thirty-one years of age.

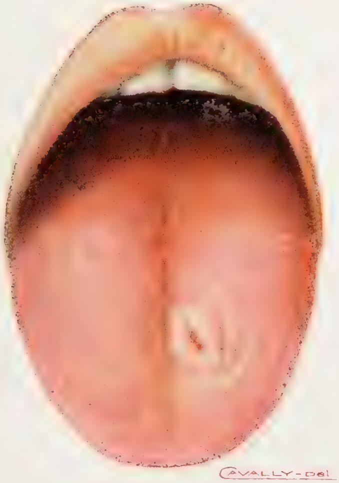

FIGURE IX.

Case 7. Lesion similar to case 14. Tuberculosis of tongue resembling gumma. Patient, male, thirty-four years of age.

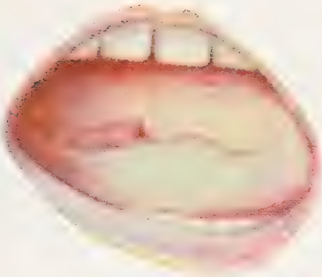

FIGURE X. Cavally

Case 9. Tuberculosis of border and under surface of tongue.

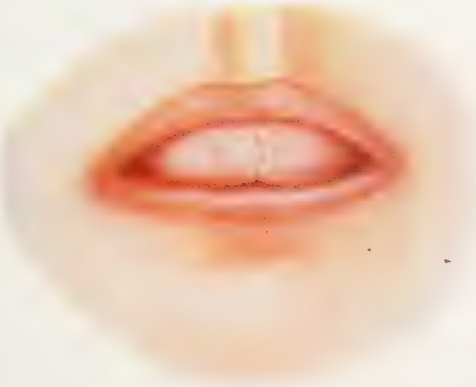

FIGURE XI.

Case 11. Fissured ulcer of tip of tongue.

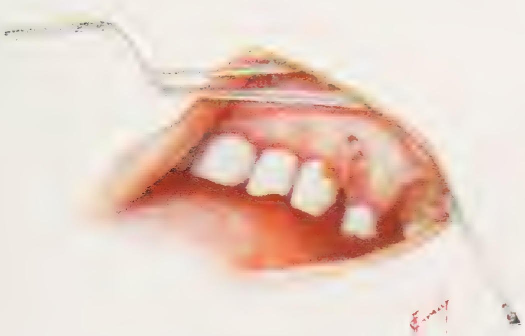

FIGURE XII.

Case 4. Tuberculosis of alveolus of left superior maxilla.

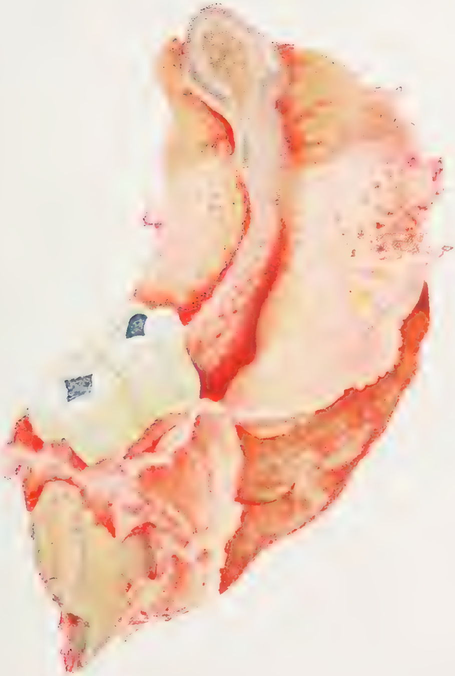

FIGURE XIII.

Specimen from case 2. Tuberculosis of mandible and lower lip. Male, thirty-four years of age.

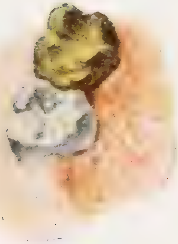

FIGURE XIV.

Case 5. Tuberculosis of tuberosity of upper jaw. Patient, male, twenty-seven years of age.

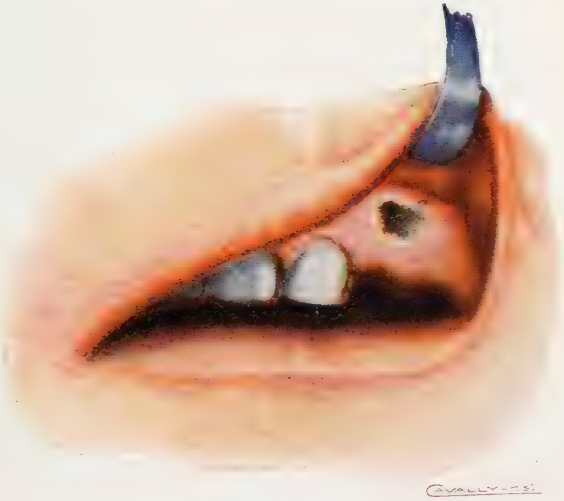

FIGURE XV.

Case 6. Tuberculosis of upper jaw. Patient, male, twenty-nine years of age.

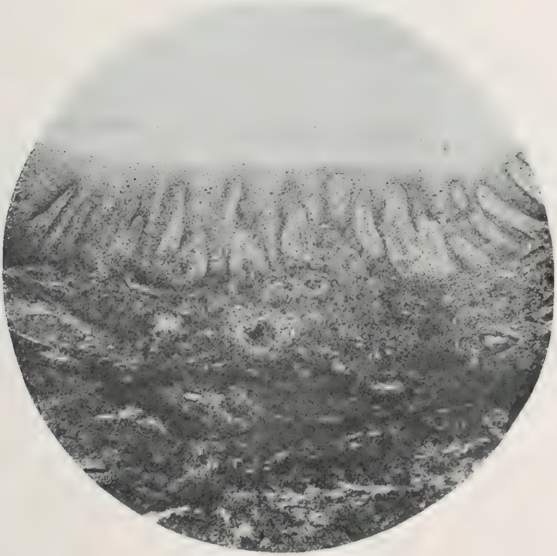

FIGURE XVI.

Case 16. Showing relation of tubercle to epithelium. Tissue taken from gum margin between first and second left lower molars.

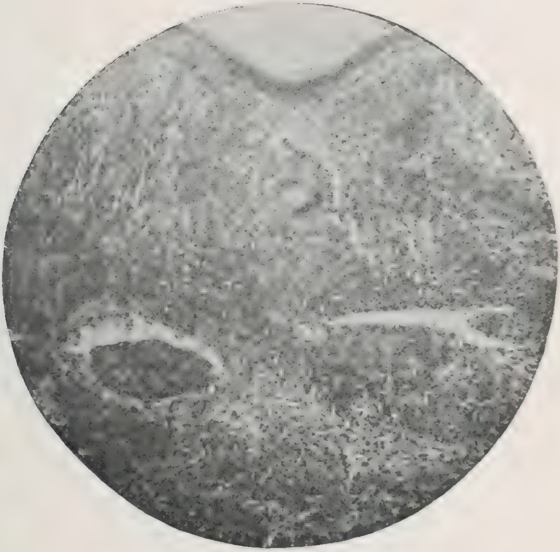

FIGURE XVII.

Case 4. Showing tubercle under epithelium and a very much degenerated tubercle in deeper tissues. Same as Figure 16.

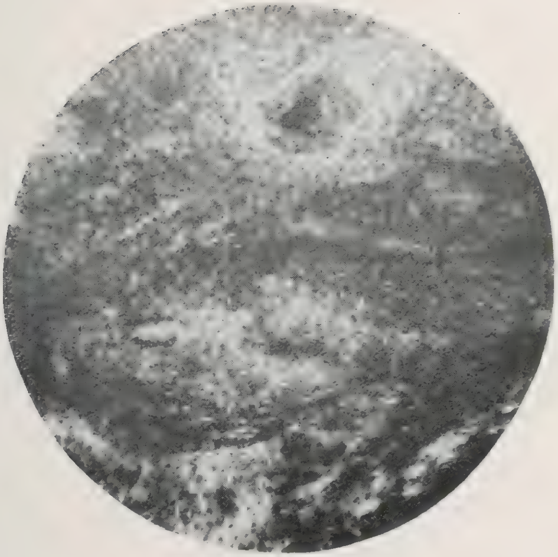

FIGURE XVIII.

Showing partially broken down tubercle.

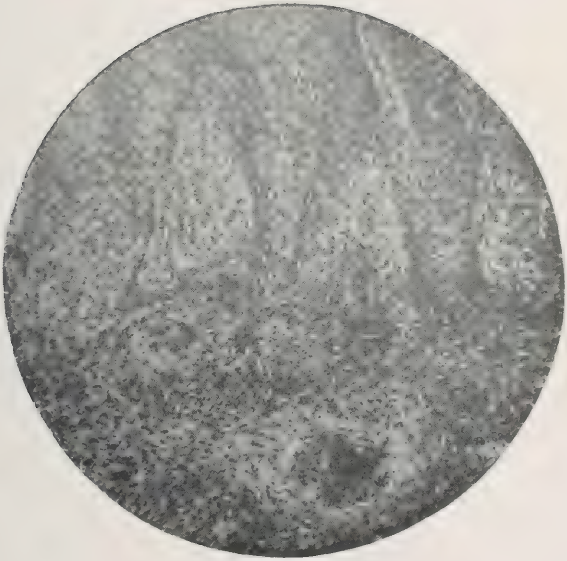

FIGURE XIX.

Showing relation of two tubercles to epithelium.

XVII.

SINISTER UNRECORDED ANOMALIES OF THE SPHENOID.*

By A. W. Meyer, M. D.,

Palo Alto, Calif.

The two following specimens, in which diverticula of the mucous lining of the sphenoidal sinuses protruded directly into the subdural space, were evidently fraught with such serious possibilities to the lives of these individuals, that I felt justified in bringing them to the attention of specialists. Since both these individuals did not succumb to complications arising from these abnormalities, it would, however, be a mistake to attribute an altogether too sinister meaning to their presence. One of these individuals lived to the age of twenty-eight years, and the other to that of thirty years without complication from the unique defect. Nevertheless, it is evident that a sphenoidal sinusitis would probably have resulted in meningitis and death, and from the position of the defects and diverticula it is also clear that probing, irrigation or other operative procedures might have resulted disastrously through no lack of skill or foresight on the part of the operator.

It is to be hoped that such abnormalities are exceedingly rare, and the absence of references in the literature to similar defects would seem to indicate this. This seems particularly true since nothing wholly comparable to them was mentioned by Zuckerkandl, Killian, Onodi, Spee, Gibson, Schäffer or Loeb and others who have made a special study of the paranasal sinuses or of the sphenoid. Nor are such defects mentioned in the large handbooks on the nose and upper air passages, with the exception of the Handbuch der speziellen Chirurgie des Ohres und der oberen Luftwege, in which Onodi refers to Spee and Zuckerkandl.

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*From the Division of Anatomy of the Stanford Medical School.

Perforate sphenoidal sinuses with subdural diverticula.

Specimen *a* is from the body of a white man, twenty-eight years of age, who died of tuberculosis. (See figure 1, Spolia anatomica addenda, Meyer, 1915.)

There are two sphenoidal sinuses, as usual, in this specimen, the right sinus extending several millimeters across the median line. The septum is located in almost a sagittal plane lying two to three millimeters to the left. The form of the right sinus is oval with its long axis, which is practically parallel to the upper surface of the basilar process of the occipital bone, making an angle of approximately forty-five degrees with the vertical. This diameter measures twenty-five and one-half millimeters, the vertical one fifteen millimeters, and the transverse (right to left) eighteen millimeters. The lining membrane of the sinuses are thin and not abnormally adherent anywhere. The roof of the right sinus is very thin, measuring only 0.35 millimeters (by micrometer caliper) directly beneath the sella and a little to the left of the median line. Its maximum thickness is only 0.5 millimeter.

Although the configuration of the left sinus is similar to that on the right, it is much smaller, measuring only eleven millimeters in a transverse (right to left) diameter and twenty-two millimeters in the longest oblique direction. It, too, is normal in appearance. The combined sinuses extend only about half way beneath the sella. The ostia are normal in size and position.

The nasal cavity is capacious but normal in appearance, and the conchæ, except the superior, are small. There are four conchæ on the left side, the posterior ethmoidal cell opening into the supreme meatus.

At about the midpoint of the ventral (anterior) portion of the lateral wall of the right sinus, immediately beneath its roof, there is an oval defect. The longest diameter of this oval defect measures seven millimeters and extends anterolaterally, lying almost in a horizontal plane and making forty-five degrees with a sagittal plane. The short diameter measures only 4.5 millimeters. Through this opening a diverticulum of the sinal lining, which is six millimeters long, protrudes into the subdural space. The wall of this diverticulum is very thin, nowhere adherent to the exceedingly thin (0.5 millimeter) but regular margin of the defect in the lateral wall, and can be inverted with entire ease. It extends slightly forward and upward into a triangular space bounded by the optic nerve anteromedially, the carotid artery posteromedially, and the reflection of the dura laterally. The dura which surrounds the base of the diverticulum on all sides does not envelop the diverticulum or cover the defect in the lateral wall of the sphenoid, but merely comes into contact with the encephalic surface of the bony margins bounding the defect. Hence it is evident that the mucous diverticulum extends directly into the subdural space, and must have been in direct contact with the arachnoid.

There is no corresponding or other defect in the wall of the left sinus, but the corresponding region is marked by a depression which lies in the base of the posterior root of the lesser wing. This root is absent on the right side. The anterior clinoid process on the left side joins with the middle process, forming a complete foramen for the carotid artery. That on the right side had unfortunately been partly removed, but the condition of the middle clinoid process, which is wholly intact, shows clearly that it was not joined to the anterior clinoid process on this side. Furthermore, the lateral sinal wall with its dural reflection shows that the posterior root was absent on this side.

The anterior and middle ethmoidal cells and the frontal sinus are large, but the posterior ethmoid cells are extremely small, being three to four millimeters in size.

Specimen *b* is from the cadaver of a man, thirty years old, who died of tuberculosis. (See figure 1.)

The left sphenoidal sinus in this specimen is somewhat larger than the right, and extends completely beneath the hypophyseal fossa, being separated from the pons by an exceedingly thin bony wall only 0.27 millimeters thick. The hypophyseal fossa is large and long in a dorsoventral direction. The dorsum sella is T-shaped in section, low (five millimeters high), and composed of a thin plate of bone which bears the large (by comparison) posterior clinoid processes. The floor of the sella forms the dorsal (posterior) half of the roof of the sinuses.

The ventral (anterior) half of the lateral wall of the left sinus contains a defect (see figure 1) similar in position and character to that in the preceding specimen. This defect is oval also, but somewhat larger than the preceding, for it measures 6.5 x 4.5 millimeters. The bony margin bounding it protrudes slightly intracranially, forming a small cuff around the defect. This margin is only 0.25 millimeter thick.

The diverticulum of mucous membrane which protrudes through this defect extends fully 3.5 millimeters beyond the plane extending across the dural reflections over the optic and oculomotor nerves and the accompanying structures. (See figure *2*.) It is slightly enlarged distally. Although the lining membrane of the sinus is somewhat thicker than that of the preceding case, it is nowhere adherent and could be removed very easily. The relations of the diverticulum to the surrounding structures are exactly the same as in the previous specimen. It has a total length of six millimeters with a width of seven millimeters in a line parallel to the optic nerve, and of 4.5 millimeters in a craniocaudal direction. Since a thin bony rim extends intracranially around the defect, for several millimeters, the optic nerve lies more above than medial to the defect. This bony rim also covers the ventral knee of the carotid artery.

The dorsoventral diameter of the left sinus is twenty-nine millimeters, and it extends several millimeters beyond the median line, which it intersects somewhat obliquely, the ventral half of the septum lying a trifle to the left of the median line. This sinus does not extend beneath the hypophyseal fossa on the right side except at its most caudal portion, although laterally to the right it extends beneath the middle cerebral fossa.

Just as on the left side in the previous case, there is a depression in the lateral wall of the right sinus in a position corresponding to the defect on the left side. As in the previous specimen, this depression was covered by the posterior root of the lesser wing, and in part also by a bony extension, not infrequently present, from the anterior to the middle and to the posterior clinoid process, which represents the ossified ligamenta interclinoidea. On the left side, on the contrary, there is no such bony union of the anterior and middle, but only of the middle and the posterior clinoid processes.

The finding of these defects in two specimens, neither of which was damaged by disease or injury, among only eight cadavers simultaneously under dissection, remotely suggests

John Burrows' dictum "That the number of birds one sees depends on the number one looks for." Not knowing of such possibilities, we had not looked for them. Nor can I believe that these instances are isolated cases, especially after having examined a small series of skulls with especial reference to the shape, form and position of the posterior root of the lesser wing and the varying osteology of the surrounding region. It is, for example, comparatively common to find a depression—i. e., an evagination of the sphenoidal sinuses—into the base of the posterior root; and in one cleaned remnant of a skull found in the laboratory, one of the sphenoidal sinuses communicated with the cranial cavity at exactly the same place as in the preceding specimens. Although the lesser wing of the sphenoid had been removed in this specimen, it was evident from the character of the margin of the defect in the lateral wall, and from the character of the wall itself, that it is not improbable that a defect was present in this specimen also before cleaning, for only a very slender posterior root could have been present. However, the mere presence of a very slender posterior root, or perhaps its absence, even, is not necessarily an indication that the sphenoidal sinus is not completely separated by bone from the cranial cavity. The absence of this root is probably only of significance if the sphenoidal sinus is as large or larger than normal—or, perhaps still better, only when there is a tendency for the sinus to extend laterally in the region of the base of the root. Just why absorption should be especially active here at the junction of the pre- and basisphenoids, I do not know, and it is possible, of course, that tension exerted through the root after fusion with the lateral wall may cause evagination of the sinus into the base of the root, or the root may be absorbed. This extension of the sphenoidal sinuses into the base of the posterior root of the anterior clinoid process is, of course, a wholly different thing than an extension of the sinuses into the lesser wings and anterior clinoid processes, said to occur in over eight per cent of skulls, according to Sieur and Jacob.

The absence of the posterior root in both the above specimens must leave a weak point in the wall at this region. Since the reflections of the dura over the carotid artery, and the second, third, fourth and sixth nerves lie at a higher intracranial level, it is evident that the dura must at one time have been depressed over this region, in order to clothe the portion of the lateral wall later occupied by the defect. In pre- and early postnatal life there could, to be sure, have been no such dural depression, but with the change in contour and in the relation of the different portions of the sphenoid and the extension of the air sinuses with approaching maturity of the bone, such a condition was bound to appear. Since in these cases the lateral wall of the sphenoid was not reinforced by the posterior root, as is normally the case, it might be assumed that this region formed a point of least resistance to the developing and encroaching air sinus, were it not for the fact that reinforcements are absent on other portions of the sinal wall and yet no perforation or defects result. That the increased intrasphenoidal air pressure associated with such occasional phenomena as sneezing, coughing or forcible and obstructed expirations of any character, could be responsible for local atrophy of the bony wall and the overlying dura, seems decidedly unlikely, although the form of the diverticula and the bony margin of one of the defects seems to suggest that their form was modified by these things. But until we know more about the cause of the development of the air sinuses and the factors which control their extension in the different directions, it seems quite futile to speculate on the genesis of such defects.

It seemed highly probable to me at first sight that the dura must have covered these diverticula, but that it did not do so except at the very beginning of their extension through the bone is beyond question. Indeed, the perforation of the dura by the diverticula is the most interesting and unexpected thing. Moreover, it would have seemed likely that the cerebrospinal fluid and the other meninges and the brain substance might have forced these diverticula of mucous membrane back into the sinuses, or at least have prevented their protrusion through the dura into the subdural space. It would also seem as if one might have expected a diverticulum of the arachnoid, accompanied or unaccompanied—probably the former—by brain, to extend into the sinus as a result of the unopposed intracranial pressure. Moreover, since a defect was produced in the dura, it also seems as though the arachnoid should also have yielded to the same influences which caused perforation of the dura.

Unfortunately the brains had been removed from both these skulls, but the duræ were undisturbed in these regions. The presence of the protruding diverticula is conclusive evidence, however, of the fact that practically no pressure was exerted upon them, for their extremities were entirely unattached to the dura, and hence their inversion into the sinuses was prevented only by atmospheric pressure. Besides, had they been at all firmly attached to the arachnoid, it is more than likely that a tag of arachnoid would have remained attached to their distal extremities when the brains were removed. Hence it would seem that the arachnoid sealed the opening.

The only investigators who mention defects in the lateral wall of the sphenoid are Zuckerkandl, Spee and Onodi. Zuckerkandl (1893) spoke of having noticed physiologic dehiscences and small gaps in the lateral walls, and Spee speaks of small defects in the region of the sulci carotici in a juvenile skull. Since small defects in the lateral walls in the region of the carotid sulci—and in other places, for that matter—are not very infrequently seen in cleaned and dried skulls, it is evident that such specimens do not furnish proper evidence regarding the actual frequency of these abnormalities. If the walls are exceedingly thin, they are easily injured when the dura is stripped, and still more easily eroded in the cleaning. Hence, skulls in which the duræ have not been removed can alone be regarded as furnishing reliable evidence.

Onodi, who observed vascular sulci and foramina in the lateral wall, and also larger or elongated dehiscences in these vascular sulci, also emphasized the fact that besides being developmental anomalies, such dehiscences may be artifacts, or result from traumata or from senile atrophy or pathologic conditions. Onodi, who examined four thousand entire and several hundred cut skulls, reported no such defects as those found in the above cases. The same statement holds for Gibson (1908), who examined eighty-five specimens. And although Emerson (1908-1909) gave a "Report of a fatal operative case showing developmental absence of the outer sphenoidal wall, and in its place a large vein communicating directly with the cavernous sinus; autopsy," a review of the clinical history of this case clearly suggests that the long standing suppuration was very probably responsible for the absence of the lateral wall of the sphenoid.

According to the clinical history, a carious area was present in the sphenoid over three years before death, and a "carious area on the floor and inner wall were curetted" over two years before death. Furthermore, at the time of the fatal operation "a carious area was felt on the outer walls," which the autopsy revealed as having been developmentally absent! In view of these facts, and the further fact that Onodi and Zuckerkandl both emphasized the occurrence of physiologic dehiscences, the conclusion that there was a "developmental absence of the outer sphenoidal wall" in Emerson's case seems extremely unfounded.

Since the clinical significance of such defects in the lateral osseous walls, accompanied or unaccompanied by protrusions of the lining mucosa into the subdural space, must be evident to everyone, emphasis on this matter is unnecessary.

While examining a small series of skulls in regard to the position and size of the posterior root of the lesser wing of the sphenoid, in connection with the defects above reported, I was much impressed by the varying relations existing between the upper portion of the genu ventralis of the carotid artery and the optic nerve and the ophthalmic artery. Ordinarily, the dorsal or posterior margin of the posterior root of the lesser wing is located from two to four millimeters dorsal (posterior) to the similar margin of the broad anterior root which bounds the upper half of the optic foramen. But if the posterior root of the lesser wing is located far ventrally—i. e., anteriorly—it allows the genu ventralis of the carotid to lie far forward. In the specimen before me the posterior root lies four millimeters anterior (ventral) to the posterior or dorsal margin of the anterior root which forms the upper half of the optic foramen. Hence, it happens that the optic nerve and the ophthalmic artery come to lie directly upon the knee and a part of the upper turn of the carotid artery as the latter runs dorsally and upward to pass through the clinoideocarotid foramen.

Such a relationship between the carotid artery and the optic nerve and ophthalmic artery may be of far less consequence if the anterior root of the lesser wing does not extend dorsally almost as far as the base of the middle clinoid process, thus forming a roof over these structures. But when, as in the specimen under discussion, such an osseous roof is present, it is evident that both the optic nerve and the ophthalmic artery are subjected to the full arterial pressure in the carotid, because the latter and the optic nerve and ophthalmic artery really lie directly inferiorly—i. e., caudal—to the broad anterior root.

In the ordinary or normal skull, both the optic nerve and ophthalmic artery lie upon the posterior root which is above the genu of the carotid artery. Hence, these structures are ordinarily protected from the direct effects of the arterial pressure in the carotid by the posterior root. Besides, since they are ordinarily not roofed over by an extension dorsally of the anterior root of the lesser wing, they cannot be forced against an unyielding structure.

In the specimen before me the foramen formed by the union of the anterior and middle clinoid processes, the clinoideocarotid foramen, is not bounded ventrally—that is, anteriorly—by the posterior root, as is usually the case, but by the margin of the broad anterior root. This ordinarily forms the upper anterior boundary of the optic foramen, and the posterior root forms the dorsal and inferior boundary. Consequently, in this specimen the optic nerve passed through two foramina—the optic and clinoideocarotid.

It is rather venturesome to draw inferences from the relationships here given, and I am reminded of the wisdom of the old saying: "Let not the cobbler go beyond his last." Yet one seems justified in asking whether the considerable pressures exerted in these cases upon the optic nerve by the carotid artery might not lead to optic atrophy as a result of direct pressure or of circulatory disturbances due to interference with the arterial current in the relatively small ophthalmic artery. Since the pressure in the carotid is exerted at right angles to the latter, such a result would seem to be inevitable unless the latter arises from the carotid unusually close to the optic foramen. The optic nerve could not escape this pressure, however; and since the pressure from arteriovenous aneurisms can cause interference with vision and optic atrophy in a comparatively short time, it is difficult to realize how the optic nerve could resist the considerable pressure in the carotid if exerted throughout the lifetime—or practically that—of an individual. It is also known that the comparatively temporary pressure exerted by the walls of the sphenoidal sinus, as a result of distension by inflammatory processes, may cause optic atrophy. This fact, too, it seems to me, confirms the above supposition as to the possible effects of pressure from the carotid. My friend, Professor Rusk, also informs me that the pressure exerted on the base of the brain by extremely tortuous and sclerotic basilar arteries may cause symptoms of hemiplegia. Unfortunately, no operative procedures would be likely to reveal or could hope to relieve the conditions produced by these abnormalities.

The tuberculum sella (olivary eminence) is absent in this specimen, and the optic chiasmaticus very deep. The ventral or anterior wall of the hypophyseal fossa is practically vertical. The left sphenoidal sinus is spherical, and only about four millimeters in diameter. The right is oval, and measures about six millimeters in the longest axis. The ostia of these small sinuses were comparatively large, and opened almost directly downward. They were located in a plane directly ventral (anterior) to the posterior root of the lesser wing.

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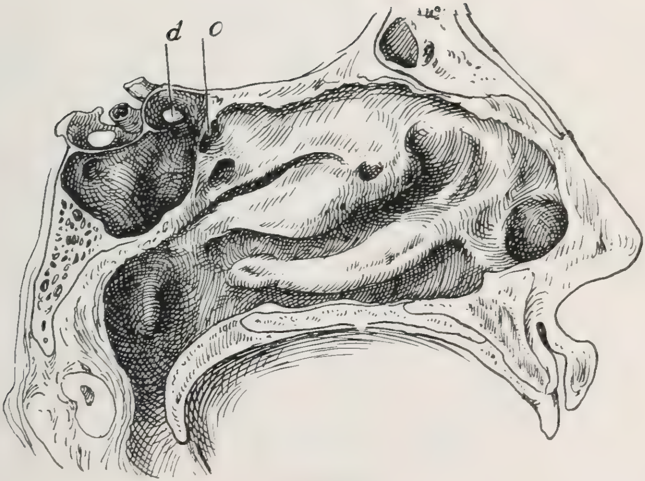

FIGURE 1.

Lateral View.

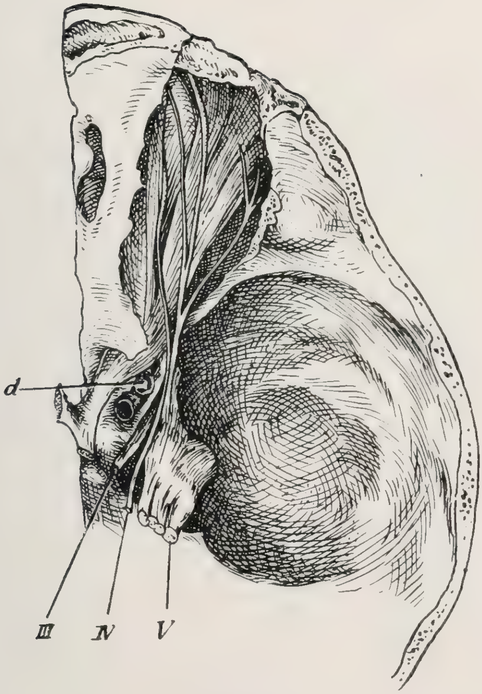

FIGURE II.

Superior View.

XVIII.

POLLEN THERAPY IN HAY FEVER.*

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Within a few years numerous reports have appeared in regard to the treatment of hay fever patients by the subcutaneous injection of pollen extracts. The writers, among whom may be mentioned Freeman, Noon, Cook, Clowes, Koessler, Manning, Oppenheimer, and Gottlieb, have uniformly reported that a certain number of patients so treated have received more or less complete relief from the disease.

The object of the following paper is to report the results of observations based upon one hundred and twenty-two cases of hay fever examined during the past twelve months, with reference to determining, if possible, the value of this treatment, and also to ascertain what biologic relations, if any, exist between the pollen of different plants.

In the first place, a word should be said in regard to the method of obtaining and preserving the pollen extracts. For many plants, which furnish an abundance of easily detached pollen, it is sufficient to gather the partially opened flowers, bring them into a room without currents of air, and in the course of a few days the pollen may be shaken upon smooth paper. This applies particularly to those plants the cross fertilization of which is effected through the agency of air currents, such as many forest trees and grasses, and certain Compositæ, particularly ragweed. In the entomophylous plants, where the cross fertilization is largely effected by the agency of insects, the freshly opened anthers may be clipped and gathered. The pollen is then either placed in the solution for extraction, or it may be preserved dry for an indefinite period.

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I have taken pollen from specimens in my herbarium, gathered twenty-five to thirty years ago, of grasses and of ragweed, which on the addition of water excites as marked a skin reaction as would be the case with freshly prepared extract.

The extract is obtained from the pollen by soaking in water for a few hours. I have not found it necessary to subject the material to trituration, as advised by some writers; and this is also theoretically unnecessary, since the pollen grains in water promptly undergo a swelling, with solution of their albuminous contents. Several observers have complained of the difficulty of preserving the extract, and say that it is liable to deterioration on standing. After a number of tests, an alcohol dilution of thirteen to fifteen per cent seems to meet the requirements; and material prepared in this way a year ago has apparently lost little of its efficiency. It is interesting to observe, in this connection, that we have an example of a natural plant juice, namely, wine, in which preservation of its qualities is thus secured. The heavier natural wines contain a considerable amount of albuminous matter, together with approximately fourteen per cent alcohol. More than this percentage checks the further development of the yeast plant, and this amount, while preventing decomposition, does not seem to be sufficient to cause a precipitation of the proteids of the wine. It is desirable to keep the solution in amber bottles.

A word of caution should be said in regard to the gathering of flower heads for the preparation of pollen extract in the case of those plants which may contain a poisonous substance, as occurs in certain Compositæ, especially the wormwood group. I have observed a few cases where disturbing symptoms of nausea and malaise followed the injection of such material to a greater extent than would be accounted for by the actual amount of pollen present. In the case, however, of such plants as the Rosaceæ and grasses, these precautions are unnecessary, and we may, in the case of the latter, find it more convenient to strip off the flower heads or anthers by hand.

When the pollen has been gathered and a suitable extract prepared, the latter constitutes then the stock solution from which varying dilutions are prepared. It is theoretically desirable to prepare a stock solution with a definite percentage of pollen extract; but practically this is unnecessary, since individuals differ very widely in their degrees of sensitization, and each case must be examined by different dilutions to determine the correct strength which it is safe to use for him.

As has been described by other writers, and by a previous publication of mine, the tests are made by making a series of superficial scratches on the skin of the arm and gently rubbing in a drop of the pollen extract to be tested into a scratch. After five to fifteen minutes the positive reactions are indicated by varying degrees of local disturbance. These disturbances of the skin may be ranged in order of intensity as follows: In some cases the first perceptible alteration consists in a sharply circumscribed white area, not elevated, bordering the scratch for a distance of one-sixteenth to one-eighth of an inch. We may find in other individuals the first manifestation to consist of a slightly reddened raised area. In more pronounced disturbances the area of swelling is more extensive and is more or less white in color, being surrounded by an area of reddening of varying size. When this degree of disturbance appears, it is usually accompanied by itching. It may in marked cases attain a considerable size, the edematous area reaching one inch or more in diameter, and surrounded by half an inch or more of hyperemia.

The intensity of the skin reaction does not always seem to be proportionate to the clinical symptoms of hay fever. I have seen numerous severe cases where the skin reaction was much less than in other individuals, who apparently suffered from a milder form of the disease. In the case of children, the skin disturbances are relatively less pronounced than in the case of adults, and I have observed several under ten years of age, with apparently well defined hay fever, who showed no reaction to the prevailing pollens borne in the air at the special season.

Examination of my cases by this method shows that the hay fever season in eastern North America may be divided into four periods, as follows: The first period coincides with the flowering of the earliest blooming plants, the second with the flowering of the grasses, the third with the midseason flowers of July, and the fourth with the opening of the autumn blooming Compositæ.

Of the first period, thirteen patients were observed who gave positive reactions to one or more of the following plants:

Coltsfoot (Tussilago).
Dandelion (Taraxacum).
White maple (Acer dasycarpum).
Willow (Salix nigra).
Alder (Alnus incana).
Birch, white, yellow and black (Betula papyrifera lutea and lenta).
Hawthorne (Cratægus sp.).
Apple (Pyrus malus and floribunda).
Lilac (Syringa var.).
Oak (Quercus rubra).
Tulip.
Lily of the valley.

The symptoms which these early bloomers excite are relatively mild, and depend chiefly upon the abundance of the plants in the vicinity of the patients. For many individuals the annoyance is so slight as to be perhaps not worth treating. In others, a residence surrounded by maples or oaks, or with an orchard close at hand, may cause considerable discomfort. The most severe cases of this season which I have seen were from maple and oak. If there is only one sensitization, the period of disturbance is brief and disappears with the drying or shedding of the flowers in question.

The second period, represented by thirty-six cases, is ushered in with the flowering of the grasses. Owing to their abundance and the range of the blooming period of the different species, it is relatively severe and prolonged. Coincident with their flowering we may find an associated disturbance from many garden flowers, but for the majority of individuals, these latter are of minor importance. It is probable that if these June cases can be rendered immune to grasses, the other causes will be borne without much trouble.

The third period, represented by ten cases, has been shown by my observations to be due in great measure to the midseason Compositæ, such as field daisy, hawkweed, yarrow, etc. With these are many species reported by patients which are still to be studied, such as chestnut, phlox, mountain laurel, and numerous other plants of restricted distribution.

The fourth period, with seventy-seven cases, begins with the general flowering of the ragweed, goldenrod, asters and the late Compositæ, and lasts until frost. My examination of the fields and roadsides at this season shows that the common plants other than the Compositæ are relatively innocuous and may be disregarded. Such are, in the vicinity of Boston, the wild carrot (Daucus carota), pigweed (Chenopodium), hardhack (Spirea tomentosa), and other representatives of these families.

From the foregoing observations it is evident that in this vicinity the chief causes of hay fever are the grasses and the late Compositæ. The early and midseason forms are briefer and less severe.

The possibility has been suggested that sensitization to proteids may arise through some parenteral entrance of the albumen in question into the body, and that hay fever, for instance, may originate from the contact of a given pollen with a scratch or abrasion of the skin. If this should be the case, it would certainly lay the method of testing by skin reaction open to serious objection, as we should thereby run the risk of exposing the individual to numerous sensitizations. I have gone over this point carefully with many patients, testing them repeatedly with pollens to which they were originally negative, and have not, in any case, discovered the subsequent development of a sensitization.

METHOD OF TREATMENT.

The dosage is determined in the following way: After the special exciting pollen has been ascertained by the skin test, a second series of scratches is made at a distance from the first, and different dilutions of the pollen extract in question are applied. It is important not to have this test applied in the vicinity of the skin which has been reddened by the first tests, as an increased excitability of this region is present, and even a simple scratch will cause localized swelling. The dilutions may be most conveniently made by adding a certain amount of the stock solution to alcohol of the same strength, and a twenty-five per cent, ten per cent, one per cent, and even weaker, dilution of the original extract are applied to the second series of scratches. The initial dose is determined by the dilution which fails to excite a definite skin reaction, and for the sake of causing as little smarting from the alcohol as possible, the quantity of material injected should not exceed five or ten drops. I should also recommend postponing the injection of even a small amount until after the reaction from the first skin tests have subsided, since a considerable amount of absorption from these probably takes place, and the introduction of an additional amount has seemed to me in a few cases to cause systemic disturbance. The injections may be made at intervals of two days to a week, increasing by a few drops at first, and later by the absorption of stronger percentages of the stock solution. To avoid the risk of anaphylactic disturbance, I have advanced the strength at first slowly. After five or more injections have been given, the strength may be increased with greater rapidity. The disturbances occasioned by the injection of the pollen extract below the skin (not intramuscular) consist, when a sufficient strength has been attained, of a more or less well defined lump, varying from the size of a bean to that of a pigeon's egg, accompanied by a sensation of moderate heat and itching. It is interesting to note that none of the patients have complained of these manifestations as representing more than a trivial degree of discomfort, and in no case has the disturbance been sufficient to cause the patient to interrupt treatment.

Two instances of distinct but harmless anaphylactic shock were observed, one occurring in August in a man who came in somewhat exhausted from the heat, who showed extremely marked skin reactions, and who received on the same occasion a small dose of ragweed pollen extract. About half an hour after the administration of the pollen extract, he was taken with faintness, nausea, and vomiting, and had to be assisted home. The other case was that of a boy who received a dose of grass and dandelion pollen insufficient to cause local skin reaction, but who a few hours later was taken with moderate prostration, nausea, and vomiting. It has seemed to me consequently a wise precaution to make the initial dose approximately one-tenth of that which the patient can theoretically receive with safety. After a number of injections have been given, it is practicable and safe to inject a strength which may cause distinct skin reaction, without exciting general disturbance.

Beyond the immediate anaphylactic shocks above noted, I have seen in a few cases where ragweed pollen has been injected occasionally a more or less marked persistent general depression. Since using the pure pollen extract, such a condition has not occurred in my own practice, but it has been reported to me by patients treated by other physicians. It seems to me here to be a question whether there has been an injection of toxic material other than the pollen, or whether the dosage has been excessive.

RESULTS OF TREATMENT.

We have two methods of determining the effects that have been accomplished by the injection of pollen extracts: First, the behavior of the skin reactions; second, the patient's observations regarding his condition. The first phenomena, being objective in character, should afford a more reliable guide as to what has been accomplished.

INFLUENCE OF TREATMENT UPON THE SKIN REACTIONS.

In those cases which it was possible to observe for a period of two weeks to several months, the skin reactions were carefully noted at regular intervals. Of these, sixty-two showed a distinct diminution in the size and intensity of the disturbances in the skin, two showed no appreciable change.

The time required for the diminution of the skin reaction varies within wide limits, dependent both upon the plant tested and upon the individual himself. In the case of alder, willow and apple, I have sometimes obtained a marked reaction from the first application, but on repeating the application two days later, a diminution or total disappearance was noted. This sudden disappearance following the first scratch was noted also in a case of horse fever, which showed on one afternoon a very extensive swelling from the application of antitoxin to a scratch, but who on the following morning, tested with the same antitoxin, showed no reaction, and has shown none since. In the case of grasses, and even more in the case of ragweed, a slower disappearance of the reaction was noted. With ragweed and cosmos particularly I have observed in some cases a persistence of the skin reaction, even after weekly injections carried on for a period of four to six months. In these more obstinate cases an increased tolerance, however, was noted in spite of the persistent swelling. This tolerance was shown by the disappearance of itching which the first injections had caused, and by the smaller amount of hyperemia surrounding the edema.

Twenty-one cases of those whose reactions had diminished in the course of treatment were examined again after the lapse of two to six months. Of these, nineteen showed no return of the skin sensitiveness, and some of them showed a still further diminution. Three cases after the lapse of three months showed a distinct return toward their original degree of sensitization.

INFLUENCE OF TREATMENT UPON THE HAY FEVER SYMPTOMS.

In describing the results which have followed the injection of pollen extracts, it has seemed to me desirable to separate those cases which have received treatment during the hay fever season from those which have been treated during the winter or out of season. I have done this for the reason that it is difficult during the course of an attack to draw accurate deductions from the statements of the patients themselves. We have, in the first place, to remember that seasons vary in the severity of hay fever symptoms, dependent upon the amount of rain, heat, and cold. Furthermore, the individual's predisposition seems to vary, perhaps as the result of his physical state and habits at the season. Finally, the element of suggestion may conceivably play a part. While I shall, therefore, report the summer cases with reference to the degree of relief obtained, I do not regard these figures as at all conclusive. On the other hand, observations carried out during the winter with reference to changes in the intensity of the skin reaction, may be considered a fairly reliable guide, if it be admitted that the strength of the solutions themselves has not undergone deterioration. This latter point is difficult to determine with absolute certainty. Nevertheless, my alcoholic solutions seem now, after the lapse of months, to effect in new cases nearly, if not quite, the same degree of skin reaction which they occasioned when in a fresh state.

At the date of writing, one hundred and twenty-two cases have been observed, of which seventy-four have had more or less treatment, and forty-eight have been seen but once, or are now beginning treatment. Of the cases which may have been considered to have had a sufficient amount of treatment to enable us to draw more or less definite conclusions, thirty-two were treated after the onset of the hay fever symptoms.

and forty-seven were treated during the winter or early spring. Of those cases which were treated either at the beginning or immediately before the hay fever season, twenty-six expressed themselves as having been more or less relieved, eight could not see material improvement. In estimating the results actually achieved by treatment during the season, I believe that an accurate judgment would place the extent of the relief in a number of instances distinctly below that which the patients expressed. In other words, I believe the element of suggestion plays here a considerable part. Furthermore, a certain number of these who believed themselves improved showed but slight diminution in the extent of the skin reaction. It has seemed to me that such cases probably represent too high a degree of sensitization to obtain material relief during the hay fever season, and that a longer period of treatment is required. On the other hand, several of these individuals who reported some months later, showed a marked diminution in their skin reaction, and it was possible then to undertake their treatment with the result of bringing about still further a diminution in the intensity of the skin disturbances. About one-fourth, however, of those treated during the season experienced after a certain number of injections, ranging from four to twelve in number, such striking diminution in their subjective sensations and in the skin reactions, that it seemed difficult to ascribe the gain to anything else than the treatment, the improvement noted having occurred from one to three weeks before the disappearance of their type of hay fever in this vicinity.

THE BIOLOGIC RELATION BETWEEN DIFFERENT PLANT PROTEIDS OR POLLENS.

It is evident that in this work a knowledge of the biologic relationships of the exciting plants would be of the greatest aid. If, for instance, we can say that the protein of two exciting plants is identical, we shall need to inject the pollen of only one.

While we do not know clinically the relation of the different plant proteins, yet from a botanic standpoint they have been studied by serobiologic methods by numerous observers.*

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*Physiologische-systematische Untersuchungen ueber die Verwandtschaften der Angio-spermen. Mez und Gohlke, Cohn's Beitraege z. Biologie der Pflanzen, 1913.

The methods employed were the precipitation reaction and the agglutination method. Extracts of the plant albumen were made, removing first, where present, fats, oils, acids, alkaloids, starches, glycogens, and sugar. These extracts were then injected into rabbits, preferably into the abdominal skin. As a rule, the interval between injections was from three to four days.

With reference to the time required for immunization of the rabbits, no exact figures can be given. Sometimes a potent immune serum can be produced after three to four injections, but cases also occur where, even after ten injections, very little immunity had appeared, and at times entirely failed to occur. Apparently the individuality of the animal is a factor. Uhlenhutt mentions that of ten rabbits injected with the same albumen, only one showed a potent immune serum. The test is done by removing a small amount of blood from the marginal vein of the rabbit's ear, adding a portion of the extract which was used for injection, and centrifuging. If the serum is of high potency a precipitate is shown. The animal is then separated from the others, not fed for twenty-four hours, and then killed. The blood is received in sterile glasses from a carotid incision. The serum must be perfectly clear and show no opalescence. Finally, the serum must have no free antigen—that is, the animal must not be killed too early after the last injection. The serum, if absolutely sterile, is easily preserved in dark glasses and closed with sterile cotton.

Precipitation Method.—Dilutions of the plant extract are made, beginning with 1 to 200 and ending 1 to 50,000. To each of these dilutions a cubic centimeter of serum is given. After keeping in the thermostat for an hour at 37° centigrade in the more dilute preparations, there is a precipitate which demonstrates the value of the serum. The procedure in the case of material related to the original one is analogous. A precipitate shows a relationship, the absence of precipitate indicates that relations of identity with the original albumin are not present.

Agglutination Method.—Here one places in different glasses the same dilution of the extract, according to the content of albumen, for instance, 1 to 200, and to these glasses different degrees of immune serum are added, 8/100 of a centimeter, 2/100 of a centimeter, 1/100 of a centimeter and 5/1000. These mixtures are then sensitized for two hours in the thermostat, and after the lapse of this time, 4/10 of a cubic centimeter of fresh, active ox serum is added, whereupon, in the case of related albumen, coagulation occurs. This method has shown itself particularly adapted, provided we have a specially potent immune serum. In any serum the two methods should be employed before important results are accepted.

It is desirable in these tests to bring the solution to the same content of albumen.

A large number of families have been already studied with regard to their position in the system. It has been shown that the development of the angiosperms extends from the Selaginellaceæ over the pines towards the magnolias, that the yews divide laterally from the pines, while the Gnetaceæ form another lateral branch of the conifers, and then the trunk runs from the barberries towards the roses and ends with the myrtles. The magnolias and barberries belong to the common stem of the roses and crucifers. The trunk must take a branch below the Ranunculaceæ, of which the ends are the crucifers and the roses. In phylogenetic respect the barberries are older than the buttercups. Likewise the pea family are closely related to the roses. The trunk then proceeds from the roses to the Crassulaceæ and saxifrage family, and ends with the evening primrose and myrtles. The mignonettes and Capparadaceæ lie between the barberries and mustard family. Since the albumen of the mignonette and Capparadaceæ reacts like the albumen of the poppies, it is possible that the branch of the stem between the magnolias and Capparadaceæ takes place above the mignonettes. Poppies do not act reciprocally with the mustard. The mignonettes, however, stand close to the violets. The teagle family, Dipsaceæ, which apparently resembles the Compositæ, does not react with it, and we have here to do with an interesting case of convergence.

The accompanying diagram shows the mutual relationships of the families which have been studied by their serum reactions. Unfortunately, the position of the grasses is not given in this diagram, as they belong to a separate trunk, namely, the Monocotyledous, but this fact renders it sufficiently evident that their albumen is wholly distinct from that of the dicotyledous. It has, however, been established that they are closely related in their reactions to the Liliaceæ.

From the foregoing considerations it is evident that the families which chiefly concern us in this present connection, namely, the Gramineæ, the Compositæ, the Rosaceæ, and certain families of trees, have no serobiologic affinity with each other. Consequently, an individual sensitized to one family alone would not react to the pollen of a distant group. Where two families are closely related, as in the Rosaceæ and Leguminosæ, a positive reaction might be expected to both. The clinical evidence in this regard extends as yet only to the Gramineæ and the Compositæ. Clowes showed in 1913 that in individuals sensitized to both grasses and ragweed, immunization against the former conferred no immunity against the latter. Much consequently remains to be studied in this respect.

In the case of genera within a given family, a relationship of proteids has been shown to exist, as already stated. We should, therefore, expect an individual suffering from ragweed sensitization to react positively also to goldenrod and to the other members of the Compositæ. A case which reacts positively to beach grass would also react to June grass, red top, etc. A case reacting to roses would react to apples, cherries, spirea, etc. We have, up to the present time, clinical confirmation of this view only in the case of grasses. Noon and Freeman showed that injection with one species of grass would also protect against other grasses studied. While they found the pollens identical, yet some grasses seemed to yield a more active extract than others, and in their later work used timothy grass by preference. My own study of the skin reactions in the case of grasses confirms this view, and, as I have previously reported, patients sensitized to one species react positively to others, although one may bloom in June and another—e. g., beach grass—in August.

Sensitization to the Compositæ represents for us in America the most important forms of hay fever. This is sufficiently shown by the generally accepted opinion of the majority of sufferers, and is confirmed by my own statistics. The question, however, has remained as yet unanswered, whether among the compositæ themselves subdivisions exist of a serobiologic nature. While we may admit a sufficiently definite affinity to cause positive precipitation or agglutination reactions among all its members, yet it is conceivable that the proteid of the Compositæ may be still further differentiated in a manner corresponding to the different genera. Following the same hypothesis, we may imagine an individual sensitized primarily to the goldenrod proteid, who may show only in a relatively minor fashion sensitization to ragweed, with which he has perhaps never previously come in contact. He may consequently show marked reaction to the former and but slight reaction to the latter, yet in virtue of the underlying biologic affinity of the two proteids, immunization to the one may confer resistance also to the other.

During the past year I have studied ten species of the Compositæ, representing as many genera, in an effort to obtain light upon this subject. Two methods have been used: first, the classification of patients with reference to their reactions or preponderance of intensity of their reactions to the pollen of these Compositæ; second, observation whether injection of one species of pollen would influence the skin reactions to other pollens.

I.—CLASSIFICATION OF REACTIONS.

A summary of the relative frequency of the various sensitizations is as follows:

Ragweed	82 cases positive,	24 negative
Goldenrod	48 cases positive,	50 negative
Cosmos	28 cases positive,	25 negative
Field daisy	28 cases positive,	37 negative
Hawkweed	20 cases positive,	39 negative
Yarrow	21 cases positive,	28 negative
English daisy	16 cases positive,	19 negative
Tansy	11 cases positive,	20 negative
Coltsfoot	5 cases positive,	2 negative
Dandelion	6 cases positive,	1 negative

The disparity between these figures immediately suggests the question whether the different test solutions contained proteids of different strength, so that individuals with but slight sensitization did not react to certain weaker solutions, when they might have reacted to stronger ones. That this is not the case seems to be shown by the following table of twenty illustrative cases:

TABLE I.

Case	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ragweed	4	3	3	4	4	0	3	3	3	3	4	4	4	..	1	3	1	2	3	4
Goldenrod	1	2	3	0	0	3	0	2	3	4	2	1	3	0	1	1	0	0	4	1
Cosmos	0	4	0	..	4	0	4	4	4	4	1	0	4	..	1	3	3	0	0	1
Field Daisy	0	3	0	0	0	0	0	2	0	0	0	2	2	0	1	0	0	3	..	1
Hawkweed	0	3	0	0	0	0	0	2	1	3	1	..	3	0	1	0	0	1	0	..
Yarrow	0	..	0	0	0	..	..	2	0	1	1	2	2	0	1	0	0	3	0	0
English Daisy...	..	2	..	3	..	..	..	2	1	..	1	..	..	..	1	..	3	..	..	..
Tansy	..	..	0	0	0	..	..	2	1	..	2	..	4	..	0	..	0	..	0	0
Coltsfoot	4	..	..	..	..	..	..	..	..	..	4	..	..	..	4	..	..	..	..	..
Dandelion	4	4	..	..	..	..	..	..	..	..	..	..	..	3	..	1	..	..	..	..

The intensity of the skin reactions is shown by the numerals: 0—Negative. 1—Slight. 2—Moderate. 3—Considerable. 4—Marked.

From the table it is evident that all manner of variations exist in the primary or preponderating sensitizations of individuals. I have been particularly struck by the difference in the grouping of reactions exhibited by patients coming to me from different localities. As yet sufficient data are not at hand to enable me to generalize in this respect, but experience so far has led me to expect a different display of reactions in a patient of my vicinity from that shown in a patient from western New York or the middle West.

II.—INFLUENCE OF TREATMENT UPON REACTIONS OF RELATED POLLENS.

The second method of determining the relations existing between the proteids in the related genera of the Compositæ, has been by the following method: A patient which shows sensitization to, for instance, ragweed and goldenrod, is injected in the usual manner with ragweed pollen and observations are made at intervals with reference to the goldenrod reaction. In some of these cases so studied it has been evident that with the diminution in the intensity of the ragweed reaction there is a diminution likewise in the goldenrod reaction, which, however, follows at some distance behind it, until the ragweed reaction has nearly or quite disappeared, when there is a sudden drop in the goldenrod reaction. My observations in regard to this point are as yet incomplete and demand further study before they can be regarded as conclusive. There seems, however, here a promising field for study, and the method is suggested for the consideration of investigators who are entering upon this work.

If these observations are confirmed, they will serve to indicate that there are slight differences between related genera and yet a fundamental relationship.

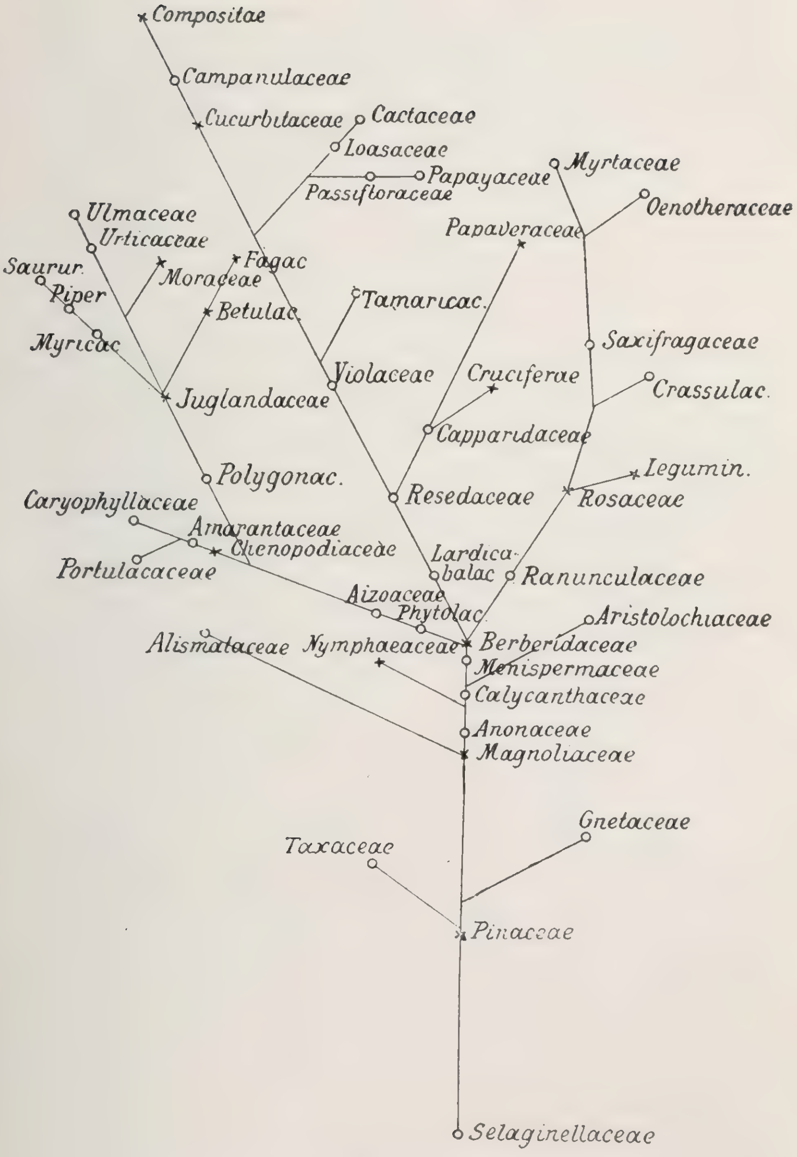
From the theoretic point of view, it would follow that while we may be able to accomplish immunization to all members of a given family by the injection of pollen from one, yet more rapid results may possibly be attained by employing a mixture of these pollens to which the individual shows preeminent sensitization.

The question may possibly be raised whether the parenteral administration of plant proteids may cause harmful alterations in the organs of the body. Longcope has shown that nephritis may be set up in animals by the subcutaneous injection of egg white. No examinations have been undertaken, so far as I know, on hay fever patients, as to whether the injection of pollen extract has been followed by the occurrence of albumin in the urine. I have made no examination of my hay fever patients in this regard. A case of horse asthma, which I have reported elsewhere, received for a period of several months weekly subcutaneous injections of horse serum, in doses which finally reached the amount of five drops at each injection. The urine in this case was examined before and after treatment with negative results.

CONCLUSIONS.

Serobiologic methods have shown the phylogenetic relationship of the different plant orders and families. The application of these discoveries to the treatment of hay fever by injection of plant proteids promises to assist in the selection of the specific material required for a given case.

Definite reactions are elicited in hay fever by the pollen of the exciting plants when brought into contact with an abrasion of the skin. The intensity of these skin manifestations may be sensibly diminished by the repeated parenteral administration of the proteids in question. Coincident with the diminution in the skin reactions there seems to occur an increased tolerance of the exposed mucous membranes to the pollens of the plants employed. Pollen therapy in hay fever may be regarded at the present time as a promising method of treatment, but its value and the permanence of its results remain still to be definitely established.



After Mez and Gohlke.

XIX.

EXPERIMENTS WITH AUTOSERUM IN THE TREATMENT OF HAY FEVER. THE RELATION OF ANAPHYLAXIS AND EOSINOPHILIA TO HAY FEVER. A GENERAL SURVEY OF NEW METHODS OF TREATMENT.*

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Within the past year a new advance has apparently been made in the treatment of various persistent and chronic dermatoses by the use of autoserum. Among those who have been doing a large amount of work in this direction are Dr. Wm. S. Gottheil and his associates. Gottheil[1] in April of this year published his first report, which was followed later[2] by a more lengthy survey of the subject.

In this report the writer speaks enthusiastically about the beneficial changes that take place, particularly in the cases of psoriasis. All of the cases treated were of long standing, with extensive lesions, in which the usual treatments were of no avail. Gottheil summarizes his experiences with autoserum by stating "that it has a peculiar influence for good which enables us to clear off the skin in one-tenth the usual time, with very weak and innocuous local medication, and without any internal treatment at all." His results have been corroborated by Dr. John A. Fordyce and Dr. Howard Fox.

As a result of the encouraging reports in the treatment of the dermatoses by autoserum, it occurred to the writer that it would be worth while trying this same form of treatment in cases of hay fever. He arrived at this conclusion after noting the similarity of hay fever to various skin conditions. His premises may be summarized as follows:

1. Hay fever is a local manifestation of some internal derangement of the system.

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*Candidate's thesis, accepted by the American Laryngological, Rhinological and Otological Society, December, 1914.

2. Hay fever has associated with it a nervous element which results in a local paresis of the blood vessels of the nose.

3. Hay fever occurs at well regulated intervals, and mainly affects definite parts, namely, the mucous membrane of the nose, eyes, throat, and lungs.

a. Psoriasis (with some others of the dermatoses) is a local manifestation of an internal derangement of the system.

b. Psoriasis has associated with it a certain nervous element.

c. Psoriasis occurs in definite localities on the skin (mainly extensor surfaces).

This line of reasoning was further substantiated by reasoning along biologic grounds, for (1) there are certain anaphylactic reactions present in psoriasis and other dermatoses which are at the same time present in hay fever and asthma. (2) A marked eosinophilia is present in the dermatoses and is also present in hay fever and asthma.

It was not, therefore, inconsistent or unreasonable to suppose that if a definite improvement or even cure could be obtained from the use of autoserum in the dermatoses, it could be obtained in hay fever and asthma.

The writer, therefore, began a series of experiments in August of this year, waiting until the patient was in the prime of his hay fever attack before beginning the injections.

Autoserum, as the name indicates, is a serum obtained from the patient into whom afterwards it is to be injected. The method of obtaining this serum is very simple, and is as follows: A constricting bandage, preferably of rubber, is wound around the patient's arm above the elbow until it is tight enough to almost obliterate the pulse. In a few moments the arm becomes a dull purple from the venous engorgement, and a vein from which to draw the blood is readily selected. Very often the very superficial veins are too small, and a deeper one must be palpated for. The desired amount of blood may be withdrawn in a number of ways. At first the writer used the MacRae needles, as suggested by Dr. Howard Fox. These needles are very small and are fitted into a rubber cork which can readily be inserted into a fifty cubic centimeter bottle. On one side is a thin narrow canula, to which a piece of rubber tubing may be attached for suction. It is claimed that after the blood once starts to flow, a continuous stream may be kept up by proper suction through the rubber tube; but it was the writer's experience that on account of the small caliber of the needle it became clogged with coagulated blood very readily, so that it was difficult to withdraw all the blood that one desired. He therefore had recourse to the simpler (and what seemed to the patient more barbarous) procedure of using a twenty-five cubic centimeter all glass syringe to which could be attached needles of suitable length and caliber. He was able in this latter way to withdraw as much as twenty-five to thirty cubic centimeters of blood.

The blood was immediately projected into a sterilized fifty cubic centimeter bottle, made of a suitable size so that it could be used in an electric centrifuge.

This blood was then centrifuged at great speed for from twenty to twenty-five minutes, at the end of which time it was seen that the serum had been nicely separated from the red blood cells. It should be straw colored in appearance, but very often a small amount of the coloring matter of the blood tinges it, which apparently does no harm.

This serum was then drawn up into a sterilized all glass syringe and reinjected into the patient, either subcutaneously or intravenously. The writer found the former method satisfactory, and in no instance was there any untoward results. A large swelling often appeared at the time of the injection, but this disappeared within a few hours.

In a few instances when the centrifuge was out of order, it was necessary to allow the blood to stand over night in the ice box. The separation under these circumstances was just as good, but whether any chemical change took place, it is impossible to say.

In this series of experiments twelve cases were treated. The treatments were given in the writer's office, under the best conditions possible. Each patient was intelligent enough to let him know in a satisfactory way just what results there were from the injections. At first there seemed to be a period of vast improvement, and he was in hopes that we were at last on the road to a discovery of some specific cure. However, the improvement lasted but a very short time, and then the patients were just as bad as ever. It is, therefore, necessary to report these experiments from a negative point of view, in the hope that it will lead others to do further research work along the lines of experimental biology.

It will be noted in the cases which are reviewed that the amount of serum injected was very much smaller than that used by the skin specialists. Gottheil in his later paper speaks of one case where he withdrew as much as one hundred and fifty cubic centimeters of blood, from which he obtained seventy cubic centimeters of serum. In these cases the largest amount of serum injected was fifteen cubic centimeters, but it seemed that it should have been possible to obtain a reaction of some sort from this small amount, if the treatment was going to do any good at all. Again, it is possible that in the treatment of the dermatoses the injection of such large amounts of serum was not necessary. As the susceptible hay fever patient is very sensitive to an infinitesimal amount of pollen, it is not unreasonable to suppose that moderate amounts of serum ought to show some reaction, if the treatment were to be worth anything at all.

It is worthy of note in the series of cases under observation that most of the patients had tried many of the newer treatments for hay fever, and in no instance was even a semblance of a cure effected.

A few of the cases are detailed below:

Case 1.—Mrs. K. First attack of hay fever nine years ago, returning each year and lasting from about the 15th of August to the end of September. She tried no cures except "cold" remedies until this year, when she was given hypodermic injections of some serum two or three times a week during the hay fever period, but with no benefit. After the season was over she was in a general run-down condition.

On August 17th this patient had ten cubic centimeters of blood withdrawn; on August 19th, nineteen cubic centimeters; August 21st, twenty-five cubic centimeters, and August 25th, thirty cubic centimeters. At the first sitting five cubic centimeters were injected subcutaneously in the arm; on the 19th, twelve cubic centimeters; on the 21st, ten cubic centimeters were injected into the buttocks, and on the 25th, eight cubic centimeters were again injected into the arm, after the blood had stood in the ice box for twenty-four hours. During the first week the patient seemed considerably improved, but after that time there was a retrogression, and the patient was as badly off as ever. This patient has a general hypertrophy of all the mucous membrane of the nose.

Case 2.—Major D., whose hay fever dates from 1889. He found that when he was away from the United States he had no hay fever, but if he returned to this country in the summer it would be just as bad as ever. He had been stationed in Washington, West Virginia, Portland, Oregon, and other places, and in each place had hay fever. He had tried atropin, adrenalin chlorid and sprays of various kinds, with no relief.

Twenty cubic centimeters of blood were withdrawn on August 17th, half the amount in serum being reinjected, and the procedure repeated on August 19th. The patient then left for Porto Rico. His statement of his symptoms was as follows: August 18th he was worse; there was some discomfort most of the day. After the second treatment, until night time he seemed considerably better, but he woke up with a sensation of swelling in the right nostril. On the 20th he had very little discomfort all day. On the 21st he had an attack lasting for two hours. On the 22d he sailed for Porto Rico, arriving there on the 27th of August with apparently no symptoms.

In the conclusion of the report the patient says: "Comparing this attack with my best recollections of previous attacks, I should say that the attack I had on the night of August 19th was similar to a previous one six years before. To the best of my judgment the attack this year progressed at its usual rate, and was in no manner retarded by the two treatments administered."

Case 3.—Mrs. F. had her first attack of hay fever in 1908. Adrenalin was prescribed with no result. A new attack came on while the patient was in England the following year. Walking in the open air seemed to help. "This year I have worked in my garden and played tennis, always either to ward off an attack or more often to cure one."

The patient received two injections of ten cubic centimeters, from twenty-two cubic centimeters of blood withdrawn. The injections had apparently no beneficial effects.

Case 4.—G. L. B., adult. Has had attacks of hay fever for seventeen years, from the middle of August to the latter part of September. This had been associated with some asthma. To quote the patient: "I have used at different times douches of Dobell's solution, peroxid, alkalin washes and adrenalin, coryza snuff, medicated smoke inhalation and camphorated snuff, all of which aided in clearing out the nose, insuring free breathing, and enabling me to get some sleep. This year I am using with good results camphorated snuff and a liquid to rub on the chest and veins leading to the head. Before retiring I place a small piece of gum camphor in my mouth which enables me to fall asleep."

This patient was given an injection of ten cubic centimeters of serum from twenty cubic centimeters of blood on August 26th, after it had stood for twenty-four hours. After the second injection on September 1st of twelve cubic centimeters from twenty-five cubic centimeters of blood, there was slight improvement; however, in the next few days he was just as bad as ever.

Case 5.—J. M., adult. Began to have attacks of hay fever in August, 1911, which came on after an ocean bath. The attack returned in 1912 with asthma, which was cured by a trip to the mountains. He found that taking long walks did him a great deal of good. In 1913 he had an operation on his nose with no relief. And early in August of this year his family physician gave him some serum injections which had no effect on the symptoms.

On August 18th, five cubic centimeters of blood were withdrawn and two cubic centimeters of serum injected. On August 20th, ten cubic centimeters of blood were withdrawn and five cubic centimeters of serum injected, and on August 25th, thirty cubic centimeters were withdrawn, and fifteen cubic centimeters, after standing twenty-four hours, were injected. The injections had no influence whatsoever on his symptoms. The patient has a great deal of nasal obstruction which ought to be corrected.

Case 6.—E. H. O., adult. Has had hay fever for twenty-two years, since he was twelve years old, always accompanied by attacks of asthma. During two years while he was in Europe he was immune. Sea bathing seemed to help him. He had local treatments of adrenalin and caustics. In 1909 a submucous resection was performed, as a result of which he was free of hay fever for that summer, but it reappeared in 1910. He had tried Dunbar's treatment without success.

On August 24th, thirty cubic centimeters of blood were withdrawn and ten cubic centimeters injected, and on August 31st twenty-five cubic centimeters were withdrawn and fifteen cubic centimeters injected with some slight improvement. A further report from the patient states that his hay fever symptoms were as bad as ever.

Case 7.—C. L., adult. Has had hay fever for the past ten years, first appearing at sixteen years of age. He has tried almost every kind of hay fever cure, but got no relief except by going to the mountains. A nasal operation was performed in June, 1913, which cleared the nasal passages to some extent and made breathing easier, but did not relieve the hay fever.

This patient was given five injections, ranging in amount from two cubic centimeters to twelve cubic centimeters. At the time of each injection he was considerably improved for that day, which he seemed to think was due to the relief of the congestion by the withdrawal of the blood. For the first five days after the two injections on August 18th and 20th, he was practically cured, but then he went on an automobile trip, after which his symptoms returned and were as bad as ever. The treatment was of no avail.

Besides these seven cases, five others were treated, the reports of which would be but a repetition of the above. Each was given two or more injections, ranging in amount from five cubic centimeters to fifteen cubic centimeters of serum. In every instance the treatment was a failure.

THE ANAPHYLACTIC PHASES OF HAY FEVER.

There has perhaps been no one disease in which so many remedies have been tried as in hay fever. Individual idiosyncrasies are apparent. One patient will be cured or relieved by adrenalin sprays, another by the ultraviolet rays, another by active bodily elimination, another by one of a dozen quack remedies on the market, another by osteopathy, another by Christian Science, etc. Certain patients have been decidedly relieved by operative procedures upon the nose. There is no doubt that the correcting of nasal deformities and obstructions, and the elimination of various diseased processes in the nose, will alleviate the symptoms for a certain time at least, and it is even productive of cure in a few cases.

Ballenger,[3] in his latest work, states that he believes the primary cause of hay fever in many instances to be an affection of one or more of the sinuses, principally an affection of the ethmoidal cells.

Lloyd, in his book on hay fever, claims that he has cured and relieved eighty per cent of his cases by proper local measures. "It cannot be too distinctly stated that eighty per cent of cases of hay fever and asthma can be cured if the directions which are given are carefully followed." Among those directions are the use of the cautery and the knife.

There is no doubt in the writer's mind that the primary irritation in all cases of hay fever is in the nose, although it must be remembered that the mucous membranes of the eyes, throat, and lungs are also affected. For this reason it is universally considered that hay fever is essentially a nasal condition. It is just as reasonable to suppose that urticaria is a skin condition. Unfortunately, thus far we have been handicapped in our search for the basic cause of hay fever. The writer believes that his premises can be substantiated when he states that hay fever is an anaphylactic condition.

In order to corroborate this opinion, it is necessary for us to study more carefully the various phases of anaphylaxis and serum disease. The first studies along this line were on cases where injections of antitoxin had been given for diphtheria; since that time the various anaphylactic reactions of other irritants have been repeatedly observed. For example: It is known that certain susceptible individuals are anaphylatic to iodoform, and other individuals to other drugs. This was formerly considered hypersusceptibility.

The most important studies within recent years in anaphylactic conditions are those of Anderson and Rosenau, and Geo. H. Weaver.[4]

An interesting case of anaphylaxis is described by Milton,[5] in which he states that a certain child of ten months, under his observation, was anaphylactic to egg albumen, which gave rise to laryngeal stridor, fever to 103°, an urticarial rash, and a swelling of the tonsils. The symptoms came on within a half hour after feeding the child with egg albumen. Toleration was found when one drop of egg albumen was added to a quart of water. This child was gradually trained to the use of albumen by diminishing the amount of the dilution day by day.

Another interesting case is reported by Smith,[6] of buckwheat poisoning. The patient could not tolerate even a small amount of buckwheat.

Experimental anaphylactic reactions have been obtained in animals, principally by the use of various sera from other animals.[7] One could go on to state innumerable cases of the same sort.

Among other phases of anaphylaxis the following are mentioned by Moschcowitz: (1) A previous susceptibility. (2) An exceedingly minute quantity of toxin is capable of inducing the symptoms. (3) Experimental reactions can be obtained by mouth as well as by injection. (4) The toxin may enter through a mucous membrane. (5) The susceptibility is transferable by heredity. (6) The symptoms are both local and general.

When anaphylaxis is induced experimentally the symptoms noticed are usually as follows (Moschcowitz): Restlessness, coughing, sneezing, swelling of the mucosa of the nose and pharynx, rapid and irregular respiration, and apparent dyspnea. This stage is followed by symptoms of cyanosis, finally respiratory paralysis and convulsions, resulting in death. Such symptoms have been noted in socalled serum disease in human beings.

The similarity between the phenomena of experimental anaphylaxis in animals and serum disease in human beings to asthma, hay fever, and urticaria are very apparent. Serum disease occurs only in susceptible individuals. "The toxic substance enters by the mucous membrane, and is specific for the susceptible individual. That asthma, hay fever, and urticaria are frequently inherited is an observation known to every clinician. Furthermore, the quantity of toxic substances necessary to bring forth symptoms in any one of these maladies is extremely small . . . ." (Moschcowitz.)

Another point of similarity between hay fever patients and animals with anaphylaxis may be noted in the fact that in both conditions there is swelling of the mucous membranes of the nose and throat, associated with sneezing and coughing.

We have thus far established the fact that certain symptoms in hay fever may be simulated by experimental work on animals, and that certain phases of serum disease show symptoms analogous to those of hay fever. The relationship between hay fever and asthma is also significant, in that symptoms of the latter are seen in anaphylacticized animals.

It has also been noted above that a very minute quantity of irritant is necessary in order to bring about certain anaphylactic reactions—i. e., egg albumen, and buckwheat. It is not, therefore, unreasonable to suppose that in order to get reactions in the human being which might be considered anaphylactic, only small doses of the irritant would have to be introduced into the system. It is impossible to state definitely in any given case just how much of a certain irritant will cause a reaction, and it is also impossible to state in just what individuals reactions will occur. Perhaps the reason why very few of these patients respond to the remedies usually applied is that the basic cause of the condition has never been discovered, and that the susceptibility of the individual varies greatly. We do, however, know that there are certain systems which are hypersensitive to specialized agencies, and very often these agencies are those which are never discovered until the individual gets such agency within his system. The best evidence of this fact is the numerous cases of poisoning—i. e., severe urticaria—induced by crab meat and other shell fish. Such a food may be given to one hundred individuals at the same time, and only one individual will be found anaphylactic.

Returning now to the study of hay fever, we must assume the hypothesis, which has been more or less proved, that this disease usually manifests itself by introducing into the system certain toxic substances, usually in the form of minute granules of pollen. That hay fever patients are anaphylactic to pollen and to nothing else, and that normal individuals are not, has been proved by the experiments of Clowes,[8] in two papers published in 1913. He states that all attempts to induce hay fever symptoms in normal individuals by introducing into their eyes pollen extracts mixed with the serum and nasal secretions of sensitized individuals have failed, and he also proves that the average hay fever patient is extremely sensitive to some substances to which the ordinary individual will not react. "It may be concluded that specific enzymes capable of splitting pollen protein and liberating a toxin factor, or immune bodies capable of combining with a specific body present in the pollen extract to form a toxic combination, are either not present or not demonstrative in the blood or secretions of hay fever cases." (Clowes.)

The susceptibility of hay fever patients to pollen itself varies greatly, and the writer believes that in certain experiments which he has in view, he will be able to determine with accuracy what the susceptibility of the patient is. As a rule, only minute particles of the pollen are necessary to produce symptoms; so that in experiments such as these, dilutions must be made up in the hundreds of thousands. When once the susceptibility has been ascertained, it will then be necessary to immunize the individual in the same way that other individuals and animals have been desensitized when they have shown special anaphylactic reactions.

It also must be allowed that patients having hay fever inhale vast quantities (comparatively speaking) of pollen from various kinds of plants. Certain patients develop symptoms of hay fever only from one or two kinds of pollen, and in order to effect a cure (of which more will be said later) it is necessary to find out what the individual susceptibility is. For example: Clowes found one woman who was anaphylactic to timothy pollen but not to ragweed.

Moschcowitz draws attention to the fact that the various common diseases in which anaphylactic reactions are present are usually associated with an eosinophilia. "In asthma, hay fever, and urticaria the blood contains an excess of eosinophiles; the secretions of the bronchus and of the nose in asthma and hay fever, respectively, are filled with eosinophile leucocytes. In urticaria also eosinophile cells are abundant in the wheals . . . An eosinophilia, both local and general, is found in nearly all skin lesions (e. g., eczema, prurigo, Dühring's disease, pemphigus, psoriasis, etc.) . . . In connection with the association of many of the manifestations of the exudative diathesis in 'neurotic' individuals, it is significant that Neusser and others have shown that eosinophilia is a common finding in such individuals."

A GENERAL SURVEY OF THE NEW METHODS OF TREATMENT.

In taking up this chapter, the writer does so with the full understanding that the final word has not been said. It seems to him that the most important work that has been done within recent years in the treatment of hay fever has been undertaken by the laboratory worker and not by the rhinologist. The writer would hesitate to name the thousand and one different remedies that have been advertised within recent years in the treatment of this disease, but he must call attention to the fact that up to the present time even the most enthusiastic workers have had to modify their published assertions as to positive results.

We should leave out of consideration at this time individual remedies and operative measures which have been performed for the cure of hay fever. For although each and every one of these may have an individual value, taken as a whole, no definite success can be reported.

The first important communication suggesting that hay fever did not arise from the irritation of hay, but from the pollen of certain flowering grasses, came from the pen of John Elliotson[9] in 1830. The disease was recognized in America a few years later, a description appearing in Dunglison's "Practice of Medicine."

Charles Blackley, himself a sufferer from the disease, established definitely during the early seventies, that hay fever was a disease due to pollen. He concluded by experiments with pollen on his eyes and mucous membranes of the upper air tract that pollen did produce catarrhal and asthmatic symptoms, and that the graminaceæ produced the most marked symptoms.

Passive immunization was first begun by Dunbar and his pupil, Praussnitz, who was a hay fever sufferer, early in this century. They brought out a preparation called "pollantin," which can be obtained in the form of a liquid, powder, ointment or pastille.

The preparation is obtained as follows: Horses are selected which show a suitable reaction by the injection of small doses of pollen protein—characterized by a local swelling and urticaria. The selected horses are given increasing doses of the pollen protein at intervals for months, when they can be kept in a sensitized condition. At the height of this sensitiveness (which can be measured) they are bled, the serum is separated, and phenol added. The potency is measured on hay fever patients by ophthalmic reactions. A great many patients react markedly to as small a dose as one-two hundredth milligram. For more definite information one should consult the papers of Dunbar and Praussnitz.

As to the results of Dunbar's serum, one cannot say positively. Certain authors claim that fifty per cent of the patients can be kept free from symptoms, and twenty-five per cent show a partial result. The German Hay Fever Association states that a full success has been observed in about fifty per cent of cases, and a partial success in twenty-five per cent. Some patients claim that pollantin has made them worse. Most of the writer's patients suffering from hay fever have tried Dunbar's serum with absolutely no beneficial result.

Graminol was put on the market soon after Dunbar's serum. Weichhardt worked on the theory that a serum obtained from cattle during the flowering season should contain certain immune bodies. Apparently, from the report of the German Hay Fever Association, the results from this product were as satisfactory as from pollantin.

Active immunization with pollen protein has been attempted with fairly successful results in the past few years. Most of this research work has been done by laboratory workers, more from an experimental point of view than from a clinical or practical one.

Clowes, Lowdermilk, and Koessler have all done work in this line, and it will be exceedingly interesting to detail some of their experiments.

Clowes prepared an aqueous solution of the pollen of ragweed by precipitating the pollen with acetone and extracting with water. He treated eight cases by giving injections of this solution very much diluted, so that the injection varied from one cubic centimeter of 1/5,000,000 dilution to one cubic centimeter of 1/500,000 dilution. He claims that there was a marked alleviation of the symptoms, and states that he believes that the failure of the usual treatment is due to giving too strong injections.

During the year 1913 Lowdermilk[10] treated nineteen cases of hay fever with successful results in sixteen. The toxin was prepared as follows: One gram of mixed pollen of different varieties of plants found in that locality was mixed with ten grams of sterilized fine sea sand in a sterile mortar: one hundred cubic centimeters of physiologic salt solution, in which was a small amount of carbolic acid, was measured out and the pollen moistened with a portion of it. The mass was then ground for several hours, with the addition of portions of salt solution, until the sand was reduced to an impalpable powder. The remainder of the salt solution was then added, the whole transferred to a sterile flask and allowed to stand at room temperature for twenty-four hours with frequent shaking. The fluid was then pipetted off, centrifuged and sealed in glass ampules, each containing one cubic centimeter. The unit is the quantity of toxin extracted from one microgram of pollen. As prepared, each cubic centimeter of stock solution contained ten thousand units. From the stock solution two serial decimal dilutions were made, containing one thousand and one hundred units to the cubic centimeter. By using a tuberculin syringe it was possible to administer doses containing any desired number of units. Lowdermilk was unable to determine the proper dosage in advance by the usual methods, and relied entirely upon the nature and extent of the reactions obtained. In certain cases, where pus seemed to be present in the nose, autogenous vaccines were given.

Koessler[11] gives in most illuminating detail the most salient points of the work on hay fever up to date. He reviews the work of active immunization by Curtis, Wagner, Ingals, Noon and Freeman, Clowes and others; and in 1910 began active immunization of hay fever patients. He has treated forty-one cases by his method during four years. Five had spring catarrh, thirty-six had autumnal catarrh. Seventeen had prophylactic treatment, and nineteen were treated during the attack. Four have been completely free from symptoms. Of the four, three had treatment over two seasons and one over three. Twenty-nine were very much improved, both subjectively and objectively, while eight cases showed little benefit. Twenty-three of the forty-one patients had asthma. Of these, sixteen were much benefited, six having no asthma.

Koessler's preparation was made from ragweed, and a saline extract was obtained as follows:

One-tenth gram (one centigram) of pollen is broken up as finely as possible in an agate mortar, and gradually ten cubic centimeters of an eight and one-half per cent salt solution, ten times as strong as a physiologic salt solution, is added drop by drop. This saline suspension is shaken for two hours and then left in the incubator at 37° centigrade for sixteen hours. Then the extract is again shaken for two hours, centrifuged, and the supernatant fluid separated with a pipette from the undissolved residue. The supernatant fluid, which is a dilution of 1/1000, is diluted ten times with sterile distilled water plus .25 per cent phenol, which makes the salt solution a physiologic one, and the dilution 1/100,000. From this dilution all others are prepared. This dilution and all lower ones are unstable and deteriorate by progressive proteolysis into a toxic product within eight to ten days. The concentrated pollen solution in eight and one-half per cent saline is more stable, and can be kept on ice for three weeks.

An alcoholic extract can be made by precipitating a saline extract in ten times its volume of ninety-five per cent alcohol.

The minimum toxic dose was determined by dropping solutions onto the conjunctiva of a hay fever patient until a marked hyperemia was produced. This varied between one-twentieth cubic centimeter of a 1/500,000 dilution to a one-twentieth cubic centimeter of a 1/10,000 dilution. Persons who are not susceptible do not show any reaction, even when large amounts are used. The initial immunizing dose used by Koessler was one-half the amount needed to give an ophthalmic reaction. The injections are given subcutaneously, and are repeated at intervals of four to ten days, depending upon the amount of immunization, as determined by the ophthalmic reaction. It is best to give prophylactic treatment, starting in May, but Koessler has been encouraged by the results obtained during the actual hay fever attack.

The writer is beginning a new series of experiments along the lines here suggested, which he hopes will add still more to our knowledge of this subject. Koessler's work is very encouraging and deserves the recognition of a great scientific work. The writer feels that he can best conclude by repeating Koessler's last words:

"I wish to express emphatically a word of caution. It will not be long before the commercial manufacturers of vaccines see 'the great advantage and benefit' of this treatment. Hay fever vaccines will be praised and advertised and put up so attractively that their use will become universal, and soon universally discredited. For the pollen extract is not stable, especially not the higher dilutions. By progressing proteolysis, after three to four weeks, it acquires marked toxic properties which lead to severe reactions. The solutions must, therefore, be freshly prepared every eight to ten days, if these reactions are to be avoided. Whatever the method of active immunization, whatever the dosage and technic, the one sound basis that must underlie all these endeavors is that the material to be injected must be not only sterile, but constantly of uniform potency if used in the same dilution. No extract of pollen can comply with this demand if it is older than three weeks."

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XX

ACCIDENTAL PNEUMOTHORAX DURING TRACHEOTOMY, WITH REPORT OF A CASE.*

By Samuel Iglauer, M. D.,

Cincinnati.

In the literature on tracheotomy one seldom finds any mention of the occurrence of pneumothorax as a complication of the operation. The fact that this complication may occur was rather forcibly called to my attention in a case recently under my care.

The patient, a male child, aged twenty-three months, was brought to my office by Dr. M. Behrman, on Friday morning, January 8, 1915. The doctor stated that about two o'clock of the same morning he had been hurriedly summoned to relieve the child of a severe choking spell which subsided somewhat after he arrived and had applied adrenalin to the larynx.

The family physician and Dr. Behrman had been in attendance on the child since the previous Wednesday, at which time, while at breakfast, the baby had had a sudden choking spell while eating a piece of rabbit. The child's mother had attempted to dislodge the foreign body (supposed) with her finger. At the time of the physician's first examination nothing abnormal was observed in the throat except a slight trace of blood.

After the initial attack the child became hoarse but not croupy, while wheezing respiration without cough was noted at times. On the following day the wheezing respiration became more labored. No fever was noted during the illness, and the physical examination of the chest had revealed only slight variations from the normal.

When I saw the child it was suffering with severe inspiratory dyspnea, increasing paroxysmally at times. There was marked inspiratory retraction of the lower thorax. Cyanosis at times became extreme.

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A direct examination of the larynx failed to show a foreign body or membrane. Owing to the urgency of the case the chest was not examined. The diagnosis of foreign body in the air passages was made from the history and symptoms.

Operation.—An incision for a low tracheotomy was begun without an anesthetic. The isthmus of the thyroid gland was exposed at the upper margin of the wound, and the apex of the thymus gland presented at the lower angle. Before the trachea had been opened I noticed fairly large bubbles of air collecting at the lower angle of the wound. This continued for a short time. The air seemed to be drawn into the wound and then bubbled out. Throughout the operation the child struggled continuously, so that I found it necessary to summon my neighbor, Dr. Mithoefer, to aid in the operation. Ether was then given and the tracheotomy easily completed. Immediately after the tracheotomy tube was inserted the child collapsed and became almost pulseless, with extreme pallor and cold extremities. Camphor was injected hypodermically and the patient revived.

Subsequent History.—About one hour after the operation Dr. Lange made a roentgenogram of the chest. This failed to reveal a foreign body, but plainly showed a pneumothorax of the right side, with almost complete collapse of the lung and a transposition of the mediastinum toward the left.

The child was taken to the hospital. Physical examination confirmed the X-ray findings. A slight emphysema at the root of the neck disappeared when the lowermost stitch was removed.

Several days after the introduction of the tracheotomy tube I thought I could hear air bubbling in and out alongside the tube, but of this I was not certain. The right side of the chest was strapped for a few days, to prevent the inspiration of secretions into the pleural sac.

Signs of diffuse bronchitis developed in the left lung. On the third day after operation a small bronchoscopic tube was introduced, but no foreign body was found. A catheter was also passed from the wound through larynx into the pharynx without dislodging any foreign body. During the first few days after the operation the temperature ranged about 102° to 103°; the pulse about one hundred and forty to one hundred and sixty; and the respiration ranged about sixty. Oxygen and stimulants were administered at frequent intervals.

From this time on recovery was more rapid. There was some difficulty in dispensing with the tube, which, however, was finally removed on the twentieth day, at which time the voice had fully returned. The lung had reexpanded by the twenty-seventh day, when the child left the hospital.

Comment.—The points of especial interest in this case were the accumulation of bubbles of air in the lower angle of the wound before the trachea had been opened, the sudden collapse immediately after the operation, the early detection of the pneumothorax by the roentgenogram, and the rapid respirations during the first few days after operation. While the diagnosis of a foreign body seemed justifiable, the case was probably one of acute subglottic laryngitis.

EXPLANATION OF THE OCCURRENCE OF PNEOMOTHORAX IN CONNECTION WITH TRACHEOTOMY.

The association of pneumothorax in connection with tracheotomy has been the subject of research by F. H. Champney.[1] His experiments were made on the bodies of stillborn children. A tracheotomy was performed and a cannula was tied into the trachea. This cannula was connected by tubing with a manometer. The movements of artificial respiration were then performed. Mediastinal emphysema ensued in seven out of twenty-one of the bodies, and pneumothorax occurred in five of these seven cases.

"Pneumothorax never occurred without emphysema, and was probably a later sequel of the emphysema. . . . Air was observed to escape from the mediastinum into the pleural sac. . . . It appeared then that the air traveled from the tracheotomy wound into the mediastinum, which in some cases it ruptured, producing pneumothorax."

Champney's explanation[1] may be summarized as follows: If the entrance of air into the trachea be interfered with during forcible inspiratory efforts, and if at the same time the deep cercival fascia be opened as a preliminary to tracheotomy, then a potential passage into the thorax becomes established, and it is through this passage that the air penetrates the mediastinum. If the pressure is equalized, it goes no further; but if the pressure is not equalized, it tends to burst the mediastinum and distend the pleural sac.

Mediastinal emphysema is due to diminished pressure in the thorax during inspiration, in contradistinction to the common form of emphysema of the neck after tracheotomy, which is purely of expiratory origin.

In addition to Champney's explanation, the occurrence of pneumothorax might also be accounted for by the accidental wounding of the pleura during tracheotomy; but this contingency is very remote, is anatomically almost impossible, and would doubtless be associated with severe hemorrhage from some of the great vessels at the root of the neck.

The chief rules laid down by Champney (op. cit.) for the avoidance of emphysema and pneumothorax are: First, to avoid low incisions in the deep cervical fascia; and second, to refrain from elevating the deep fascia before the trachea is opened. As illustrated in the clinical case recorded above, a struggling patient and a low tracheotomy seem to be predisposing factors.

As to the frequency of pneumothorax complicating tracheotomy, Champney[2] was able to find a postmortem record of six cases. Mediastinal emphysema was mentioned much more frequently. It is a fact worthy of note, however, that in a single London hospital careful postmortem examinations, under water, revealed more cases of this nature in the two years following the publication of Champney's paper than had been recorded in the same hospital in the twenty-one preceding years. Leiner[3] records a series of twelve cases of tracheotomy in children, in nine of which mediastinal emphysema ensued. Crepitation, synchronous with the heart action, was the chief symptom observed.

Owing to the circumstances under which tracheotomy is usually performed, the occurrence of mediastinal emphysema and pneumothorax may easily be overlooked, but close observation during the operation, as well as careful physical and radiographic examination after tracheotomy, will doubtless reveal the presence of one or both of these complications in a considerable number of cases pursuing an abnormal course.

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XXI.

A SIMPLE MANOMETRIC APPARATUS FOR MEASURING EUSTACHIAN TUBAL PATENCY AND TYMPANIC OSSICULAR MOBILITY.*

By Lester Mead Hubby, M. D.,

New York.

In the diagnosis, prognosis and treatment of the various degrees of tubal stenosis and ossicular immobility, some method of measuring is necessary.

This apparatus, arranged for measuring eustachian tubal patency, consists of the following parts: A spring manometer, gauging from 0 to 260 cmm. of mercury pressure, attached by tubing to a T connecting tube; a rubber cautery inflation bag attached to another end of the T; attached to the third end of the T is a rubber tube connected with a stopcock, and from this another tube ending in a nasal acorn tip.

The tube leading from the stopcock to the nasal tip must be of inelastic, rather heavy rubber, so that the air pressure will not be lowered by the expansibility of its walls. If a light rubber, instead of an inelastic rubber, tubing is used, the difference in reading before and after opening the stopcock amounts to twice as much with the higher pressures, such as 200 cmm., when forcing air into cavities of from one-half to one and one-half ounce capacities. Thus with the one-half ounce chamber connected, instead of a difference of 7.50 cmm., there will be a difference of 15 cmm. of pressure.

The acorn tip should be about 2 cm. in diameter, so that it will not be forced into the nostril on pressure.

The method followed is to close the stopcock, raise the air pressure to 10 cmm. of mercury with the inflation bulb, close the epipharynx and the other nostril in the usual manner of politzerization, then at the proper moment release the air into the nostril by turning the stopcock. If this air pressure is insufficient to open a tube and enter a tympanum, it is raised 5 cmm. at a time until the required amount has been found for each tube.

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*Read before the New York Academy of Medicine, Section on Otology, January 8, 1915.

If one method fails to close the epipharynx as indicated by immobile alæ nasi on inflation, e. g., on deglutition of water, then other methods must be tried seriatim, such as saying KKK, puffing out the cheeks, etc.

To avoid errors due to the walls of the tube being adherent or plugged with mucus, the tubes can be gently inflated before making the test, or the tests can be repeated until the exact amount of pressure required is determined.

In making the tests with some patients, it is necessary to use the diagnostic auscultation tube, on account of their inability to indicate when the air enters the tympanum.

In those instances where politzerization fails, the inflation by catheter can be used, substituting a catheter tip for the nasal tip. With the catheter, however, more elements of error are introduced, so that longer tests are needed to decide the mensuration.

This test is not intended to express the absolute air pressure in the epipharynx, as the release of the air into the terminal tube, the nasal chambers and epipharynx, lowers somewhat the pressure of air at the pharyngeal ostium. However, as the capacity of the cautery bulb chamber and tubing to the stopcock is over ten and one-half ounces, and that of the terminal tube (three drams), nasal chambers and epipharynx (when the nostrils are compressed and the soft palate raised) varies from less than half an ounce to one and a half ounces, there is not a great difference between the pressure in the bulb and that in the epipharynx.

The chart was made with this apparatus and is presented to show the approximate corrections, if it is desired to know the epipharyngeal pressure. Note that until 50 cmm. pressure is reached there are no corrections to be made.

Arranged for the Gellé test, a six ounce Politzer bag is substituted for the cautery inflation bulb, as in this instance sudden pressures and sudden releases from pressure are required.

In place of the nasal tip, an olivary aural tip of correct size, covered with thin rubber tubing, is placed on the terminal tube. It is necessary to have four or more sizes of aural tips, and the olivary form, covered with rubber, causes the least discomfort from the firm pressure required.

The method of procedure is to insert the aural tip firmly in the external auditory meatus so that there is no air leakage on inflation, start the tuning fork and place over the mastoid antrum, care being used not to have the fork sound too loudly (so as to eliminate the other ear as much as possible), then raise the air pressure suddenly to 10 cmm. of mercury, then lower it to zero, repeating this several times. Then try 15 cmm., and so on up, until you discover the pressure needed to alter the audition for the fork tones.

Unfortunately, the test is of value only in the earliest stages of ossicular immobility.

Table showing changed air pressure and the difference in air pressure, when air is released from the apparatus into chambers of one-half ounce, one ounce and one and one-half ounce capacities:

Mercury in Cu. mm. of Air Pressure	½ ounce		1 ounce		1½ ounces	
	After Release	Difference	After Release	Difference	After Release	Difference
10	10.	.00+	10.	.00+	10.	.00+
20	20.	.00+	20.	.00+	20.	.00+
30	30.	.00+	30.	.00+	30.	.00+
40	40.	.00+	40.	.00+	40.	.00+
50	49.38	.62	49.38	.62	49.38	.62
60	58.75	1.25	58.75	1.25	58.75	1.25
70	67.50	2.50	67.50	2.50	67.50	2.50
80	77.25	2.75	76.88	3.12	76.25	3.75
90	87.00	3.00	85.62	4.38	85.00	5.00
100	96.25	3.75	95.00	5.00	93.75	6.25
110	105.75	4.25	104.50	5.50	103.75	6.25
120	115.00	5.00	113.75	6.25	112.50	7.50
130	125.00	5.00	122.50	7.50	121.25	8.75
140	135.00	5.00	132.50	7.50	131.25	8.75
150	145.00	5.00	142.50	7.50	140.63	9.37
160	154.25	5.75	152.50	7.50	150.00	10.00
170	163.75	6.25	160.00	10.00	158.00	12.00
180	173.25	6.75	170.00	10.00	167.50	12.50
190	182.50	7.50	178.75	11.25	176.25	13.75
200	192.50	7.50	188.75	11.25	185.00	15.00

Note.—These figures are only approximately correct.

XXII.

ACCIDENTAL INJURIES OF THE SIGMOID SINUS INFLICTED IN SIMPLE MASTOIDECTOMY.*

By William A. Scruton, M. D.,

New York City.

In a review, which is believed to be complete, of the reported cases of septic thrombosis of the sigmoid sinus, I have failed to notice one in which penetrating wound during mastoidectomy is mentioned as an etiologic factor. Examining ten textbooks on otology, I found the danger of septic thrombosis following injury of the sinus mentioned in one only, and in that the danger is considered slight.

During my resident hospital service I am certain that I have seen ten or twelve accidental penetrations of the sinus, and having the cases under my observation subsequently, know that none of them developed a septic thrombosis. In no instance were special precautions taken to guard against sepsis at the site of the rupture. The hemorrhage was controlled by a plug of iodoform gauze and the entire cavity packed tightly—generally with iodoform gauze, in a few cases with plain gauze.

Cases closely allied to the subject have been reported. Bondy[1] cites a case of Marum, in which puncture of the sinus with a diagnostic needle resulted nine days later in operation for septic thrombosis. Green[2] reports a case in which the patient having died of other complications, autopsy demonstrated a sterile clot at the site of a diagnostic needle puncture. John R. Page[3] reports "a case of profuse hemorrhage from the middle ear immediately after myringotomy in an infant eleven months of age, followed by signs of jugular thrombosis with recovery after resection."

My personal experience with accidental injury of the sigmoid sinus has been gained entirely within the past year. Concise histories of the cases, with temperature charts and conclusions, are appended.

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*Read before the New York Academy of Medicine, Section on Otology, January 8, 1915.

Case 1.—E. K., age fourteen years, whose occupation is student in public school. His present illness occurred during the past month while recovering from a severe attack of coryza. He complained of fullness and pain in the left ear, which was relieved by application of hot salt in a bag. Within two weeks discharge appeared and pain at times became severe. The chief complaint is discharge from left ear, with swelling and tenderness over the corresponding mastoid process. On examination the left ear shows profuse purulent discharge and a thickened canal; the drum cannot be inspected. There is edema in front, behind and below the auricle. Acute mastoid tenderness is demonstrated. The right ear proves negative. He appears sickly and rather under weight; has hypertrophied tonsils and a moderately large adenoid, with a mucopurulent discharge from the nose and nasopharynx. His heart, lungs and abdomen are negative. The laboratory report of the urine analysis is negative. The temperature registers 100.5° F., pulse 110, respiration 22.

A simple mastoidectomy was performed January 6, 1913. The usual postauricular curved incision was made, with a supplementary straight incision backward. The exposed cortex was moderately thick, discolored and soft over the antrum. An opening was made in cortex at the softened area with a curette and extended with a rongeur. The mastoid cavity was found to be a lake of pus. When the pus was removed, more was seen discharging from a necrotic aperture in the bone over the knee of the sinus. The inner plate was removed with curette and rongeur, exposing an extensive epidural and perisinus abscess. In extending the exposure to healthy dura and sinus, the sinus was nicked with a rongeur at the junction of the emissary. At this point the sinus appeared healthy. Unhealthy vessel extended from just behind the knee down to the turn under the posterior wall of the external auditory canal; it was bathed in pus, the wall was discolored and apparently thickened.

Hemorrhage from the ruptured vessel was controlled by a plug of iodoform gauze. The wound was packed with iodoform gauze after flushing with hot normal saline solution. The skin incisions were not closed.

On January 7th the laboratory reported the following result of a blood examination: Leucocytes, 16,000; lymphocytes, twenty-five per cent; polynuclear neutrophiles, seventy-five per cent. A culture of the pus was also reported, showing an uncontaminated growth of staphylococcus.

The third day after operation the temperature registered 102° F.; and from this date (January 10th) to the 17th the temperature chart shows increasingly steep peaks characteristic of septic thrombosis. There were no chills recorded.

Jugular resection and exploration of the sinus was undertaken on January 17th. An incision was made in the neck along the anterior border of the sternocleidomastoid muscle. With blunt scissors dissection the jugular vein was quickly exposed; it was found to be collapsed almost down to the junction of the facial vein. After resection the neck wound was partially closed below and packed with iodoform gauze. The sinus exposed in the mastoid wound was now compressed at the extreme upper and lower limits with plugs of iodoform gauze. On incising the vessel wall between the two compression points, a hemorrhagic clot was demonstrated. This was turned out and the entire vessel wall then cut away flush with the dura. When pressure was relieved at either plug at the extremes of the sinus exposure, free hemorrhage resulted. Finally, the mastoid cavity was flushed with hot normal saline solution and packed with iodoform gauze.

The appended temperature chart shows the subsequent history of this case was a tedious combat with pyemia, terminating in death May 29th. Abscesses were opened as they appeared; they were situated in both sides of the neck, the shoulders and the back. The left knee became swollen and red, but did not progress to abscess formation.

The medical treatment of this case is of interest. Hiss leucocyte extract was given for ten days in January (twenty cubic centimeters subcutaneously twice daily). This treatment was repeated in May for a period of ten days. In February an autogenous vaccine (staphylococcus pyogenes aureus) was employed. Despite these measures, with a free use of stimulating and supporting treatment, aided by a good appetite and excellent digestion, the patient was unable to resist the pyemic invasion.

Case 2.—A. C., female, age thirty-two years; occupation, housewife. The present illness began eight days ago, while recovering from a sore throat. The onset was marked by sudden severe pain in her left ear. A hot water bottle was applied, and within a few hours discharge appeared; the pain then subsided. Her chief complaint on admission to the hospital was of sharp shooting pains in left side of the head, radiating from the ear. In addition, she complained of cough, malaise, anorexia and constipation.

Examination of the left ear showed a moderate discharge of thick pus, also mastoid edema and tenderness. The right ear was found normal on examination. When inspecting the throat the tonsils were seen to be diseased and the mucous membrane generally congested. Auscultation of the chest reevaled the presence of moist rales at the apices of both lungs; the heart proved normal. Examination of the abdomen showed nothing abnormal. The laboratory returned a negative report on the urine; also a negative report on the sputum. A microscopic examination of the pus from ear showed diplo- and streptococci.

The patient did not think there had been any loss of weight during the past year; however, she was frail appearing and suggestive of tuberculosis. She had cough for some months, and frequent attacks of sore throat. Her temperature on admission to the hospital was 98.8° F., pulse 94, and respiration 20.

On February 19, 1913, a simple masoidectomy was performed. The usual incision was made over the mastoid, following the curve of the auricle, and the periosteum elevated and retracted; this exposed thin discolored cortex which was soft at the tip. A supplementary straight incision backward was now made, in order to gain more working space. The mastoid was opened at the tip by means of a rongeur. Free pus was present in the tip cells and the antrum. The sinus ran almost directly under the cortex, and in close relation with the posterior wall of the external auditory canal. While probing over the lower part of the sinus with a small Spratt curette, endeavoring to determine if the inner plate was intact, the sinus wall was accidentally penetrated. On account of the close relation of the sinus to the posterior wall of the external auditory canal, considerable difficulty was experienced in removing the cells between them—especially after the injury to the vessel. The inner plate covering the entire sinus in the mastoid excavation was removed. In appearance the sinus was normal. The wound was flushed with hot normal saline solution and packed with iodoform gauze. The skin incisions were not sutured.

This patient after recovery from the anesthesia (chloroform) showed facial paralysis. No twitching of the face having been noted during the operation, it seemed probable that the nerve had not been severed. Complete recovery from the paralysis took place in about four months, under treatment with massage and the galvanic current.

The temperature following operation showed the characteristics of sepsis in the sinus. The peaks of the chart were higher each succeeding day until the 25th of February, when the peak recorded was 104.5° F.

From a blood examination February 26th, the laboratory reported leucocytes, 15,000; polynuclear neutrophiles, seventy-five per cent; lymphocytes, twenty-five per cent.

The wounding of the sinus at operation, the subsequent temperature with chilly sensations, and the leucocytosis led us to decide upon resection of the jugular vein and exploration of the sinus.

The operation was performed February 26th. The usual incision along the anterior border of the sternocleidomastoid muscle was made, and the jugular vein exposed by blunt scissors dissection. The vessel was apparently normal in appearance. In clamping the lower end of the vein the assistant accidentally included the vagus. Although this was immediately released, the patient afterward had a paralysis of the left vocal cord. The normal voice was recovered in about three months. The sinus was compressed above, well back of the knee and below, close to the bulb; then opened between the two compression points. A small clot was found, and free hemorrhage occurred on releasing the pressure plugs at either end of the vessel. The wall of the sinus was cut away flush with the dura. Both neck and mastoid wounds were left wide open and packed with iodoform gauze.

The subsequent temperature, as indicated on the chart, showed three high peaks in a lysis extending over eight days; thereafter recovery was uneventful.

Case 3.—B. C., male, age sixty-four years; occupation, a sail maker. His present illness began ten days ago, when, after unusual exposure, he complained of fullness in the left ear with occasional slight darting pain. A profuse discharge appeared on the fourth day, and on the fifth day his friends noticed that he did not hear well; however, he made no complaint himself of deafness or of any unusual sensation in the right ear. On the tenth day of his illness he was admitted to the hospital. (March 12, 1913). His chief complaint at this time was bilateral deafness and discharge from the left ear. An examination of the left ear showed a profuse discharge, nonodorous, coming through a small central perforation. There was no mastoid tenderness. The hearing was found to be one foot for loud spoken voice. Examining the right ear the drum was found bulging and about to rupture centrally. The hearing on this side was reduced to within a foot for loud spoken voice. No nystagmus was noted, and he gave no history of vertigo or vomiting. He was a phlegmatic individual with a normal chest and abdomen. The laboratory reported a trace of albumin and a few hyalin and granular casts in his urine. A culture of the pus from ears was reported streptococcus mucosus. On admission to the hospital his temperature was 102.8° F., pulse 100, respiration 26.

Myringotomy was performed on both ears, and orders given to irrigate with hot normal saline solution every two hours. The myringotomy improved the hearing markedly in the right ear, but there was no change in the left. Within a few days the discharge increased from the right side, and the hearing was again reduced to about a foot for loud spoken voice.

From March 12th to 22d the temperature ranged from normal in the morning to approximately 101° F. in the evening. There were no chills noted, and the patient made no complaint of chilly sensations when questioned.

Mastoid tenderness was not present at any time. The temperature chart, increasing discharge, and the character of the infection determined operation. Consent to operate was finally obtained on March 22d.

The operation was a simple mastoidectomy on the right and left ears. On both sides the usual postauricular curved incision was made, exposing thick, hard and normal appearing cortex. The sinuses were deeply situated well behind the posterior wall of the external auditory canal on either side. Free pus was found in both mastoid cavities. It was decided to investigate the appearance of both sinuses. While uncovering the left sinus it was accidentally pinched between the blade of the rougeur and the inner plate of bone and ruptured. The resulting hemorrhage was easily controlled with a plug of iodoform gauze. The macroscopic appearance of the vessel on either side was quite normal. The mastoid excavations were flushed with hot normal saline solution. Packed the left wound with iodoform gauze; the right with plain gauze. Both wounds were unsutured.

On March 23d the temperature reached 106° F. and fluctuated between 104° F. and 106° F. for the next three days, finally reaching 108° F. before death on the fifth day.

The laboratory reported on blood examination March 18th: Leucocytes, 7,000; lymphocytes, twenty-five per cent; polynuclear neutrophiles, seventy-five per cent. On March 24th the report was: Leucocytes, 12,000; lymphocytes, eighteen per cent; polynuclear neutrophiles eighty-two per cent, and culture of blood showed a growth of a hemolytic streptococcus.

Case 4.—E. B., colored, female, age sixty years; occupation, a janitress. Her present illness began four weeks ago during an attack of acute coryza. The patient suffered a severe pain in the right ear. The pain subsided in a short time and a profuse discharge appeared. On admission to the hospital her chief complaint was pain over the right side of the head and discharge from the right ear. She also complained of malaise, anorexia and constipation. Examination of the right ear showed a profuse discharge associated with a very exquisite mastoid tenderness. The left ear was also examined and was found apparently normal. The patient was a well nourished, healthy appearing woman. Examination of the chest and abdomen gave a negative result. The laboratory reported her urine as negative. The pus from the ear was reported to contain staphylococci. Her temperature at the time of admission was 100° F., pulse 96, and respiration 22.

A simple mastoidectomy was performed on October 13, 1913. An incision was made over the mastoid process, following the curve of the auricle; this was enlarged by a supplementary straight incision backward. When the periosteum was retracted, the exposed bone appeared soft and discolored.

Removing the thick cortex with rongeur, a large area of cellular zygomatic region was exposed containing pus. There was free pus in the antrum and in some of the cells at the tip. The sinus was found deeply seated, well back of the posterior wall of the external auditory canal. It was exposed by means of the curette and rongeur, and was normal in appearance. In removing the inner plate a small sliver of bone accidentally penetrated the sinus. The resulting hemorrhage was checked by a plug of iodoform gauze.

In my previous cases no procedure, other than hot normal saline irrigation, was directed toward cleansing of the mastoid cavity following penetration of the sinus. In the present case the following precautions were instituted: The wound was treated with hydrogen peroxid, then flushed with hot normal saline; this was followed by alcohol ninety-five per cent and the hot normal saline flushing repeated. The plug was removed from the sinus and the blood allowed to flow a few seconds. A fresh iodoform gauze plug was applied, the blood flushed away with hot normal saline, and the wound packed snugly (not tightly) with folded iodoform gauze in strips; one end of each strip being brought outside of the wound. The skin incision was partially sutured.

From the second to the fourteenth day following operation, a full dressing was done daily in this fashion: The packing was moistened with hydrogen peroxid and gently removed, to avoid disturbing the plug over the sinus rupture; the mastoid cavity was then wiped dry and the folded iodoform packing replaced. On the sixth day, after the packing had been removed, hydrogen peroxid was applied directly to the plug on the sinus wall and a little manipulation begun. No force was exerted. This procedure was carried out at each dressing thereafter, and on the fourteenth day the iodoform plug had practically freed itself.

Subsequent to the operation the temperature reached a fraction above 100° F. on the third day. It then returned to normal and remained approximately so until the patient was discharged from the ward

CONCLUSION.

We are taught that the formation of clot within a blood vessel, which is a stage in one of the repair processes of nature, occurs only when the latent function of the intima is stimulated to activity and a fibrin ferment liberated. The stimulation may be the result of toxic, bactericidal, inflammatory or traumatic irritation.

Accidental injury of the wall of the sigmoid sinus, primarily would appear to be of no great consequence. It becomes of serious importance, however, when infection gains entrance to the protective clot. The clot itself then undergoes dissolution, throwing toxins and living bacteria into the circulation.

It is probable that most cases of injury of the sinus wall do not result in septic thrombosis, because the sudden forceful outrush of blood carries with it the contamination introduced by the offending instrument and also tends to wash away septic material from the vicinity of the injury.

It would seem desirable when injury of the sinus occurs to undertake a more than usual antiseptic treatment of the mastoid cavity, as an additional precaution against infection of the protective clot.

In case number one the sinus being apparently involved in inflammatory process throughout the entire thickness of the wall, septic thrombosis might possibly have resulted even without the injury having been inflicted. The sinus in case number two was normal in appearance. In case number three, following the penetration of a normal appearing sinus, there almost immediately resulted an overwhelming bacteremia (streptococcus mucosus). This tends to show that the character of the invading organism has an important bearing on the prognosis.

Three of the four cases in this series developed septic thrombosis, of which two resulted in death.

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XXIII.

ETHMOIDAL EXENTERATION.*

By Charles M. Robertson, M. D.,

Chicago.

You are all acquainted with the Mosher operation for cases, not of acute ethmoiditis of a cell, but of a condition involving the entire ethmoidal chain. This paper will suppose that local treatment has been done in the nose, and that perhaps a cell or more have already been opened, with failure to relieve the case. Exenteration of the ethmoids is an operation to be performed in the type of cases in which local treatment and local operations have failed. There are certain anatomic defects in the nostril that are prone to produce ethmoiditis, and prominently among these I desire to mention one particular type. I do not know whether all of you have seen it or not, but I think that this type of ethmoiditis has not been dealt with sufficiently. That is, a type in which the septum is deflected toward the side affected, either by a bowed septum or a thickening of the upper plate—that is, of the ethmoidal vertical plate. These cases, as the books speak of them, are those in which reference is made to bowing of the septum, and also of a piling up of tissue around the junction of the quadrilateral cartilage and the bony walls. Many cases have come to my notice of deflections of the septum, where there have been submucous resections made, and these submucous resections have been limited to the quadrangular cartilage and the lower part of the bony wall of the septum. Nearly all of these cases have a thickening of the bony vertical plate of the vomer as high up as the cribriform plate, and these are cases in which, if the case is operated upon (by submucous resection), resection should be made to the cribriform plate.

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There is another type in which the cells in the middle ethmoid bone are very large. There is a cystic degeneration of the middle turbinate. These ethmoid cells are not present originally, but are produced by some inflammatory condition in the tissues and the continuation of the ethmoid cell into the middle turbinate body. This probably is a seromucous inflammation, and the cells are produced by an expansion of a cell. Some of these cases go on to suppuration, and some never suppurate. I have seen several cases in which the turbinate appeared practically normal, only that the cells in the turbinate had produced an enlargement of the turbinate, producing an enlargement sufficient to push the bony wall of the septum over and make it deflect upon the other side. These are cases in which, if the turbinate be resected, the resiliency of the wall of the septum will spring it back into place. I have seen cases of this type operated on by submucous resections and the turbinate left in place. That is the wrong thing to do.

In exenteration of the ethmoid cells, we can exenterate part or all of them.

In a paper on this subject that was read by the speaker three or four years ago, at the Chicago Medical Society, I brought out an operation which I desire to bring before your notice, in which the ethmoid cells are attacked though the bulla ethmoidalis. The operation is as follows: The ethmoid cells are exenterated and the middle turbinate saved. The operation is done after the style of Mosher, except that Mosher goes in in front, on the inner surface of the middle turbinate, at its anterior end, and breaks through into the front or ethmoidal cells. Then he tears back through the ethmoid cells and tears away the middle ethmoid bone, destroying the superior and middle turbinate bodies in one piece. With the operation I desire to call your attention to, the entrance through the bulla ethmoidalis allows you to get the lower middle ethmoid cells, and from this, if you follow back, you exenterate the posterior ethmoid cells quite easily; then, if you bring your curette forward (with an angular curette) you can get pretty well forward towards the anterior ethmoid cells.

In these cases, after the exenteration of the ethmoid is done, the middle turbinate body is fractured at the top and pushed over into the space which was ethmoid cell.

I have done several of these cases, and have watched them to see if I had an atrophy of the lateral mass of ethmoid, and to see what effect it had on the nose, regarding ventilation, and it appeals to me of sufficient importance to bring it to your attention—that the ethmoidal cells can in this way be absolutely obliterated and the turbinate saved, which is a point that is very important in the physiology of a nostril.

XXIV.

THE USE OF PITUITARY EXTRACT AS A COAGULANT IN SURGERY OF THE NOSE AND THROAT.*

By Harry Kahn, M. D., and L. E. Gordon, M. D.,

Chicago.

The rhinologist has long sought a harmless, efficient drug that will control the hemorrhage during and following operations on the nose and throat. Calcium salts have been used with indifferent success. Blood serums, either freshly prepared from the human or from the rabbit or the horse, have reliable results, but have the disadvantage that they may produce anaphylaxis. Adrenalin only produces its results on the mucous membranes, and then only when directly applied.

Citelli[1] reported to the Seventeenth International Medical Congress, in London, August, 1913, on the use of pituitary extract for the control of hemorrhage following turbinectomy, sinus operations, and tonsillectomy. Following his suggestion, we have used the drug, and with universally good results. The blood loss during and after turbinectomies was slight; in fact, the operation itself was almost bloodless. The hemorrhage following curettements of the ethmoids, also. The blood loss following the tonsil operation was greatly reduced. The snare, Sluder and Beck methods were used for the tonsil enucleation. Not a single untoward result have we had in upwards of over one hundred cases operated on, which could be attributed to the drug.

The action of this drug as a blood-stilling agent did not seem to us to be wholly explained by the action on the walls of the blood vessels, as is assumed by most writers, hence we were constrained to look further, and found that the coagulation time was reduced to from one-third to one-half or more after the hypodermic administration of pituitary extract.

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*Read before the Chicago Laryngological and Otological Society, November, 1914.

We also made a study of the blood pressure before and after the administration of the drug. This was done in the hope that we might add something to the knowledge of the blood pressure of children in normal health, and also to study the effect of the drug on the blood pressure. The systolic and the diastolic pressures were taken before and after the administration by the auscultation method. A mercury sphygmomanometer of Stanton, with the modified cuff for children, as suggested by Gerstley, was used.

The following table of cases of tonsil and adenoid operations summarizes our results:

Serial Number	Michael Reese Hospital Number	Name	Sex	Age Years	Dose of Pituitary Extract Minims	Coagulation Time Before Administration Minutes	Coagulation Time After Administration Minutes	Systolic Blood Pressure Before Administration	Diastolic Blood Pressure Before Administration	Pulse Pressure Before Administration	Systolic Blood Pressure After Administration	Diastolic Blood Pressure After Administration	Pulse Pressure After Administration
1	70929	B. B.	F.	7½	12	3:15	2:00	90	40	50	95	40	55
2	70930	S. K.	F.	11	12	3:00	2:00	105	70	35	106	60	46
3	70944	F. R.	F.	4	12	3:00	2:30	80	50	30	84	45	39
4	71104	E. F.	F.	12	12	2:00	1:30	105	60	45	106	65	41
5	71121	H. B.	M.	12	12	2:00	1:00	125	85	40	115	70	45
6	71124	N. P.	M.	8	8	2:30	1:00	85	35	50	86	...	...
7	71258	S. S.	M.	2	8	2:40	1:45	110	75	35	117	75	42
8	71259	E. H.	M.	7	12	2:40	1:50	120	60	60	122	60	62
9	71261	A. B.	F.	6½	12	3:30	2:00	100	60	40	110	58	52
10	71384	R. B.	F.	16	16	2:00	1:30	120	75	45	125	75	50
11	71389	J. G.	M.	11	12	1:30	1:00	112	60	52	110	60	50
12	71390	L. M.	M.	8	12	1:40	1:00	103	50	53	103	50	53
13	71391	M. L.	F.	10	12	2:05	1:15	100	50	40	103	68	35
14	71406	I. B.	F.	11	12	2:30	1:30	95	50	45	105	55	50
15	71446	J. F.	M.	12	12	2:00	1:15	89	50	39	92	49	43
16	71447	B. B.	M.	6	12	1:10	1:15	68	45	23	70	50	20
17	71448	M. V.	F.	14	12	2:40	2:00	120	70	50	122	70	52
18	71460	L. S.	M.	21	16	2:30	2:00	130	65	65	130	60	60
19	71504	B. N.	F.	11	12	1:30	1:00	130	40	90	140	50	90
20	71505	G. G.	F.	5	12	3:00	2:40	80	30	50	85	50	35
21	71506	H. O.	M.	7	12	3:30	2:30	130	30	100	105	40	65
22	71573	L. M.	F.	5	12	3:00	1:40	105	60	45	95	70	25

23	71575	J. G.	M.	9	**12**	3:05	2:40	115	70	45	115	65	50
24	71728	N. R.	M.	11	12	3:20	2:00	110	55	55	116	55	61
25	71860	B. T.	F.	7	12	3:45	1:15	...	...	...	...	...	...
26	71887	B. S.	F.	5½	12	2:10	1:15	118	70	48	105	70	35
27	71908	J. H.	F.	8	12	2:40	1:30	110	70	40	105	55	50
28	71914	R. J.	M.	10	12	3:00	1:15	115	60	55	105	65	40
29	71977	M. C.	F.	21	16	2:15	1:00	125	85	40	110	65	45
30	72027	R. W.	F.	9	12	2:30	1:40	110	55	55	107	60	47
31	72033	K. L.	F.	6	12	4:00	3:00	105	50	55	100	50	50
32	72034	M. K.	M.	8	12	3:30	2:30	115	50	65	125	75	50
33	72046	B. E.	M.	11	12	3:15	1:15	105	45	60	120	25	95
34	72047	B. A.	M.	10	12	4:30	4:00	135	85	50	130	85	45
35	72048	F. S.	F.	12	12	2:30	2:20	115	65	50	120	70	50
36	72049	D. K.	F.	15	12	2:45	2:15	110	75	35	120	80	40
37	72051	M. G.	F.	9	12	2:35	2:15	110	50	60	100	50	50
38	72082	J. O'D.	M.	13	12	3:30	1:45	115	70	45	105	70	35
39	72093	G. K.	F.	9	12	4:30	3:30	105	45	60	100	50	50
40	72096	E. S.	F.	11	12	5:00	3:15	105	70	35	100	55	45
41	72098	L. R.	F.	7	12	4:00	3:00	130	82	48	130	60	70
42	72102	B. R.	F.	9	12	2:30	2:15	110	70	40	100	52	48
43	72107	I. K.	M.	11	12	3:10	1:30	110	75	35	130	70	60
44	72156	L. H.	F.	7	12	4:15	2:15	122	60	62	108	65	43
45	72157	F. H.	M.	6	12	5:00	1:00	105	75	30	104	65	39
46	72184	G. H.	M.	20	16	3:30	0:45	120	60	60	115	65	50
47	72223	T. S.	F.	5	12	3:45	2:10	99	55	44	102	60	42
48	.....	R. K.	F.	11	16	4:00	1:00	...	...	...	...	...	...
49	.....	B. B.	..	9	16	2:20	0:30	...	...	...	...	...	...
50	.....	H. L.	..	29	16	2:00	1:02	130	110	20	136	110	26

Our cases, with the exception of three, were children aged from four to twelve years, to whom twelve minims of the drug were given hypodermatically. The influence on the coagulability of the blood was profound. It was reduced from one-third to one-half. In some cases a greater reduction was noted. For instance, one case required four minutes before the drug, and fifteen minutes after the administration, one minute. Another was reduced from three and one-half minutes to forty-five seconds, and still another from two minutes and twenty seconds to thirty seconds, and so forth.

The results of our observations of the blood pressures are noted below, under conclusions.

TECHNIC OF ADMINISTRATION.

Pituitary extract was administered hypodermatically in the dose of twelve minims to children and fifteen minims to adults, not less than fifteen minutes before the intended anesthetic. The coagulation time was taken before and again after the fifteen minute interval. The blood pressures were taken at the same intervals. The coagulation time was determined in the early cases with the Brodie and Russell coagulometer[2] and the remainder of the cases by the drop on the slide method.

CONCLUSIONS.

1. The coagulation time of the blood is materially reduced by the hypodermic administration of pituitary extract.

2. The hemorrhage following the nasal and throat operations is much reduced, especially those on the turbinal bodies.

3. The effect on the blood pressure of children is variable, as follows: Systolic pressure was increased in 55.31 per cent of the cases, reduced in 36 per cent, and unchanged in 8.5 per cent. Diastolic pressure was increased in 35.5 per cent of the cases; reduced in 35.5 per cent, and no change in 29 per cent.

Pulse pressure is increased in 61 per cent, and decreased in 39 per cent of the cases.

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XXV.

TUBERCULOSIS OF THE LARYNX.*

By J. Holinger, M. D.,

Chicago.

The pathology of laryngeal tuberculosis, the symptoms, the course, the prognosis and therapy depend mainly on the general condition of the patient, particularly on the condition of his lungs. It is, however, questionable whether we are justified in considering it, under all circumstances, as a secondary disease to tuberculosis of the lungs; in other words, there are few, if any, cases known where the lungs were free from tuberculosis and remained so. In 1902 and 1903 I observed such a patient, whose larynx suffered from microscopically diagnosed tuberculosis, yet he had no fever, no dullness or râles over his lungs, no bacilli in his sputum; in other words, there was at the time no affection of the lungs that could be diagnosticated. Yet in 1905 he died of a very rapidly progressing tuberculosis of the lungs. His larynx remained cured to the end.

The only case of apparently primary tuberculosis of the larynx observed by the writer took such a course later on as to make it highly probable that an undiagnosed and undiagnosable focus of the disease existed at the time of observation.

In the large number of cases with fair general condition and slowly progressing or even stationary tubercular disease of the lungs, the symptoms of hoarseness and pain in swallowing are well known. Not so well known is the changeability of these symptoms, so that for days and weeks they seem to be entirely absent, and the patient and the doctor think the disease cured, until an examination reveals the great extent and destruction caused by the disease. This is a warning that the larynx of tubercular patients ought to be examined much oftener. Early discovered lesions give a better prognosis and better results from treatment. Furthermore, it is a fact that the elimination of a focus in the larynx has a good influence on the course of the lung trouble.

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The diagnosis is usually not difficult. The subjective symptoms are pronounced. The objective examination by direct and indirect laryngoscopy reveals swellings or ulcerations, which may be found extending over the whole of the larynx, or, more frequently, over certain parts, the rear margin of the entrance of the larynx, or over the vocal cords, the epiglottis, or the space below the glottis. The sequence with which the localities of predilection are named is of importance. In the first place, the rear margin of the entrance of the larynx is given. Infiltrations of this part were often found when all the other parts of the larynx were free. Swellings of this part were also found combined with affections of other parts; for example, of the vocal cords. Whenever, in such a case, the question of differential diagnosis from syphilis or carcinoma comes up, the infiltration of the posterior part of the margin of the entrance of the larynx speaks in favor of laryngeal tuberculosis. This point is so much more valuable, as it will be found to hold good, especially in early cases, when the differential diagnosis is often at the same time difficult and important. Of course, the other means of diagnosis, von Pirquet's test, Wassermann's test, microscopic examination, must not be neglected.

To illustrate some unusual features, the following history is given:

Mr. Z., fifty-eight years old, has lost several brothers and sisters from consumption. He is not very tall or strong. He has been hoarse since one year ago; absolutely aphonic for five months, and has complained during the last two weeks of difficulty in breathing. Otherwise, he feels perfectly well, and has not lost a day in years from his business. Examination of the larynx was easily made, and showed the cavity of the larynx concentrically narrowed to the size of a thin pencil by a hard swelling of the whole wall. The vocal cords could not be seen. The walls were irregular and of the same color as the pharynx—pale pink. The microscopic examination of a piece of the wall showed the presence of an inflammatory new formation. This finding was unsatisfactory. A larger excision with a Landgraf double curette was pronounced typical carcinoma by another pathologist. At the same time the condition of the patient improved under potassium iodid. Another specimen finally was pronounced tuberculosis, with scant but unmistakable tubercles. The wounds left by the different excisions healed promptly and completely. Therefore, the curette was used freely on both sides, and on the rear wall, until the normal width of the larynx was reached. The vocal cords were normal as to color and configuration. The left one was slightly paralyzed, but the voice at once became clearer. The patient made a quick recovery and was well for several years; then he developed tuberculosis of the lungs. The voice remained clear up to a week before death, according to information from his daughter.

The first point of interest to me was the finding of a large fibrous tubercular tumor of the larynx, whose walls were so thickened by a hard swelling as to have an opening of only the size of a small pencil, causing dyspnea. The patient's larynx remained well after the excision up to within a few days before his death.

The second point concerns the prognosis and the therapy. The prognosis of tubercular laryngitis depends entirely upon the condition of the lungs. It is good if the disease of the lungs either improves or at least does not progress; for example, a teacher whom I saw first in 1898—absolutely aphonic, with swellings of her arytenoid cartilages, and red, swollen, partly paralyzed vocal cords; has been teaching ever since—about three months after I first saw her. Other similar cases might be mentioned.

In the therapy, the first requirement is absolute rest of the larynx. The patient is not allowed to talk a word. Great improvement and even cures have been noted from this practice alone. Precautions ought to be taken that the psychic effect, the depression, does not become too great. In special sanatoria this can be done more easily and more effectively. Unfortunately, few of them are available to the middle and lower classes. Germany has found ways to overcome this difficulty. The results are correspondingly better. Local applications of lactic acid, thirty, fifty and seventy-five per cent, are often of benefit, if the patient is willing to submit to the pain and discomfort they involve. At the same time the pharyngitis which is always present must not be overlooked.

Different forms of the galvanocautery, the simple stab cautery or the multiple cautery, also give very good results. In extensive applications of this agent the reaction is often quite considerable. A certain reluctance to use the knife and the curette was felt, dating undoubtedly from the time before the cocain and adrenalin. In 1913 Arnoldson[1] published a strong appeal in favor of the simple surgical methods of dealing with the different swellings. My experience in the above described case, and in others, spoke certainly in favor of this advice. The advantages are numerous. First, there is comparatively little hemorrhage, and the reaction, which is often quite serious after extensive cautery, is entirely absent. The young lady whom you saw tonight came to me absolutely aphonic. The epilglottis was at least one centimeter in thickness. I amputated the epiglottis two weeks ago—on a Saturday. On the Monday after that operation she went to work again. Her voice began to improve at once, though the larynx is not quite well.

Whether direct or indirect laryngoscopy is preferable is a matter of taste Direct laryngoscopy gives better access to the diseased parts; indirect is easier on the patient, which advantage must not be underestimated in patients who are so easily affected by psychic influences.

An important point is finally the overcoming of the difficulty in swallowing, which often occurs in the later stages of the disease. The question is of great importance. as many patients do not eat because swallowing hurts them so much that they avoid it at all costs. The consequence is that they lose weight and ground very fast. The simplest means by which to overcome that is by the use of the narcotics and local anesthetics—morphin, cocain, orthoform, anesthesin, and nerve blocking. Morphin, cocain, orthoform and anesthesin have certainly all some influence on the heart, which is absent in nerve blocking. Nerve blocking consists in the injection of alcohol in the vicinity of the superior laryngeal nerve. Since the procedure is very simple, it must be recommended in preference to the narcotics and local anesthetics. But under all circumstances we must not forget that all this will not have any curative effect. If we do not at the same time apply any local surgical measures, we simply keep busy, doing nothing for our patient.

External surgical measures, tracheotomy and laryngofissure, have both been used by the writer in a few cases. They invariably leave the patient in a much worse condition than he was before, either generally or locally, often both. Even laryngectomy was advised by some authors. Whether the life of these patients is prolonged thereby, I do not know; surely their sufferings are. Whether radium, X-ray and sun rays will accomplish all that is claimed is questionable; we are inclined to expect more of the things we do not know anything about. The well known surgical procedures have the advantage that we know what we are doing. It is true, they require experience in the diagnosis, and skill in their performance, but those are qualities that we can and have to acquire.

REFERENCE.

1. Arnoldson: Arch. f. Laryn., xxvii, 1913.

XXVI.

CHOANAL FIBROMA.*

By Norval H. Pierce, M. D.,

Chicago.

These growths constitute a group which, pathologically and clinically, are rare but interesting. There is some discussion as to their place of origin. Panse, in 1873, was the first to draw attention to these growths; and other accurate observers, among them Zarniko, believe that they originate somewhere around the rim of the choanæ, while Killian believes that they have their origin within the antrum, and gain exit to the postnasal space through an accessory opening. Kubo, a scholar of Killian's, made a broad dissection of the antra in several of these cases, and proved that at least some of them do spring from the antrum and escape through an accessory opening in the postnasal space. It is probable that they may originate both around the rim of the choanæ from the septum, and the posterior end of the middle turbinated body, as well as from the accessory sinuses. They differ altogether in structure from the myxomas or common polypus, inasmuch as they are made up of true connective tissue covered by several layers of epithelium.

Zarniko makes the point that in one of his cases well defined bone formation was present, which would at once take it out of the class of mucous polypi. They have always one peculiarity in common, namely, the very fine pedicle by which they are attached to their base.

They may grow to a very large size. Stork reported a case that measured nine centimeters long and was ten and one-half centimeters in circumference.

Zaufal reported a case which measured eleven centimeters long, six centimeters broad, and three and one-half centimeters thick. The circumference was fourteen centimeters. One of my cases measured six centimeters long from the point of insertion to the end of the growth, and at its largest portion measured three centimeters.

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They belong to the type known as soft fibromas.

DIAGNOSIS.

The diagnosis has to be made between typical postnasal fibromas, pseudopostnasal polypi, and sarcoma of the postnasal space. As is well known, the true typical postnasal fibromas occur most frequently in males, between the ages of eighteen and twenty-five. It is a remarkable incidence that the three cases that I have seen in the last three years occurred in females, one in a Japanese girl of twelve, the other two in young adult females.

The true typical postnasal fibromas at their commencement have a tendency to bleed excessively, whereas the hemorrhage from the choanal fibromas is negligible.

It has been said that another point in differential diagnosis is that the true postnasal fibromas have a tendency to form adhesions between the surrounding tissues, while the choanal fibromas do not. In one of my cases I could positively prove the adhesion which had taken place between the body of the tumor and the posterior wall of the postnasal space.

The point of origin is another very valuable asset in differential diagnosis. It is at times difficult, when the tumor has reached a size that completely fills up the choanæ and projects down into the postnasal space, to ascertain this by posterior palpation. We can, however, by means of the use of Killian's long intranasal speculum in many cases discover the point of origin, either from an accessory opening or from the rim of the choanæ.

TREATMENT.

On account of the delicate pedicle by which these tumors are attached at their base, their removal is very easy. Lange's hook is of especial use in the removal of these tumors. By means of this hook, which is inserted into the anterior naris and made to engage the pedicle, the tumor can be severed from its base very easily. It is then either caught in forceps and dragged through the nose and delivered anteriorly, or allowed to drop into the postnasal space. The snare may also be used, inserted through the anterior naris, while a finger in the postnasal space directs the snare over the body of the growth. If it is not too large, traction is made and the tumor is delivered through the anterior naris. I have also removed one of these tumors by means of a large-sized adenoid forceps, the tumor being delivered through the postnasal space.

The prognosis as to recurrence is very good. In the three cases I have had, one has not recurred after three years, one after eight months, and the other after three months.

The remarkable fact is that these tumors are so frequently mistaken for true postnasal fibromas by specialists of good repute. The differential diagnosis is easy, if we call to our aid the few points that I have already named. The mistake that is made is depending on palpation for diagnosis. These tumors may be quite fixed in position and appear quite hard to the touch—quite as hard as a true postnasal fibroma at its beginning; but with our probe we can ascertain that they do not spring from the basilar cartilage, and by means of the intranasal speculum we can most frequently discover their point of origin in the choana.

XXVII.

HAMMOND'S MASTOID SKIN GRAFTING.*

(A PRELIMINARY REPORT.)

By Frank Allport, M. D., and Alex. S. Rochester, M. D.,

Chicago.

Among the chief objections to the radical mastoid operations are:

First, the tedious healing and painful dressings.

Second, the not infrequent incomplete bone covering, constituting uncured cases.

Third, the thin and poorly nourished epithelium often present after cases are really cured, frequently occasioning the deposit of scabs, pus, etc., in the concavities of the large bone opening, necessitating indefinite treatment and care.

Fourth, the nonclosure of the tympanic opening of the eustachian tube, rendering possible more or less dripping from the meatus, thus producing unsatisfactory results; and

Fifth, depreciated hearing, owing to the formation of thick cicatricial tissue over the oval window.

These are some of the charges brought against this operation, and these are the things that can be usually avoided, if proper skin grafting is employed, according to the advocates of the procedure. We cannot deny that any or all of these misfortunes may occur; but whether they can be avoided by skin grafting or not, is another question. We have nothing to say against skin grafting; but if it will accomplish these happy results, why is this aid to healing not more generally adopted? Of course, this question is not at all conclusive, for, as we all know, many good things knock for years at the door of success before being admitted; but still, after being before the observation of mastoid surgeons for years, and occupying still an insecure position, in their minds, its great utility is certainly more or less clouded in doubt. The fact is, that whatever may be the merits of skin grafting after radical mastoid operations, the assertion can be safely made, that it is used by only a small percentage of operators. Many of those who condemn grafting have never used it, and are contented to abide by the decision of skillful operators who oppose the procedure, or who at least have good results without it, and who, therefore, see no reason to lengthen their operations by a tedious, puttering, and sometimes unsatisfactory process. Many of those who do not graft have used it on a few cases, been disappointed, and have abandoned it, forgetting the fact that this kind of work requires much practice before its real value becomes apparent. A few failures must be experienced before success will be attained. Fortunately, failures in grafting do not mean real operative failures; because, if the graft does not live, the operator can go right on treating the case just as if the grafts had never been placed. It is, therefore, perfectly safe to at least give skin grafting a thorough trial, and to only abandon its use after an operator becomes convinced from personal experience that it is, at least for him, a useless procedure.

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The chaotic condition of this subject is perhaps responsible for the insecurity of its position, as apparently no two men operate the same way. Some men graft immediately after the radical mastoid operation is performed, while others wait for from six to ten days, and then open the wound and graft. This operative distinction is not a mere notion or fancy—it is a principle; as those who do secondary grafting, do so because they do not believe that grafts can be at all depended upon to grow upon newly cut bone. Nevertheless, those who advocate primary grafting go serenely on their way, grafting primarily, and claiming thoroughly satisfactory results. Some operators believe that grafts grow best on thoroughly smoothed bone, where the graft and the bone surface come in perfect apposition, while others feel that smoothed bone has temporarily lost its highest vitality and does not furnish the best soil for transplanted skin. This has been utilized as one of the objections to using electrically driven burs in mastoid operations, as it is claimed that the bur revolves with such rapidity that superficial bone necrosis is produced, which considerably retards healing and renders grafting unfeasible. We have used the bur many times in mastoid work, and have a few times seen this occur. The first dressing reveals a superficial black necrosis, and an exceedingly offensive odor. Under such circumstances strong antiseptic daily dressings should be made, and in a short time all evidences of this temporary embarrassment will subside. We think there is no danger of this complication, however, if the operative area is kept moist by droppings of sterile salt solution. It is only where the bone becomes dry and overheated that necrosis is produced. Therefore, if the surgeon proposes to graft primarily, and a rapidly driven bur is used, the bone should be kept constantly moist, or the grafting will be a failure. We are confident that smoothed bone is better adapted to grafting than roughened bone, and no instrument leaves such a beautifully smoothed cavity as the electrically driven bur, but great care should be taken to keep the bone moist. We think that a properly excavated and prepared bone cavity has much to do with the successful termination of cases that have been skin grafted. All necrosis must be removed, the eustachian tube must be thoroughly curetted and scraped, the inner tympanic wall must be carefully but thoroughly curetted, the upper meatal wall must be removed so that it is on a level with the tegmen, and the posterior meatal wall or ridge must be cut away so that the ridge is entirely removed between the meatal floor and the mastoid floor, from the external surface of the bony opening to the point of danger for the facial nerve.

Some operators use large grafts and others use small ones. Large grafts, however, are practically used by all surgeons when the skin is inserted into a retroauricular wound, small grafts being reserved for those cases where the transplantation is performed through the meatus, when time has shown that complete dermatization of the cavity should not be expected. Some operators systematically graft through the meatus, about ten days after the mastoid operation. Under these circumstances, of course, only small grafts can be used; and they are usually rather difficult to place and to hold in position, owing to the contracted space, varying illumination, and the tendency to curl at the edges. The ease of placing these small grafts through the meatus can be increased by resorting to the following procedure: After gently cleansing and drying the cavity through the meatus, and waiting until all bleeding and oozing has ceased, the little graft is placed on a glass slide, skin side up. A very slender hollow canula or glass tube, bent or straight, with an air bag attached, is made to gently suck up the graft upon its end, by cautiously using the air bag. Under the best possible illumination, the canula loaded with the graft is passed through the meatus (which has, of course, been enlarged by the previously performed radical mastoid operation) to the granulating bone surface. The bag is now compressed gently, and the graft is blown into position, after which the canula is withdrawn, the graft is gently adjusted with a delicate probe, and other grafts placed in position in the same manner. If the grafts persistently curl at the edges, it is better to leave them alone and to continue placing more grafts, even if they overlap here and there. When the granulating surfaces are covered, the cavity should be gently packed with quite small cotton pellets, dusted with something like aristol. Some greased gauze should be gently placed over the pellets, and brought out through the meatus. The first dressing should occur in about four days, and the packings should be loosened by peroxid of hydrogen and warm sterile water. No force should be used. Gentle daily dressings may now follow, with cleansings, boracic acid powder, etc., until the case is finished.

It will thus be seen that there is a wide diversity of opinion concerning the methods of grafting after mastoid operations; and further differences of views become still further apparent, when we come to consider the varying steps of the operations. We do not intend delving deeply into the different methods of grafting. There is much that may remain unsaid, as the fundamental steps of such operations are too well understood to warrant further repetitions. There are, however, certain individual ideas, entertained by experienced operators, to which we will endeavor to briefly refer.

There can be no question that grafting large grafts immediately after the radical mastoid operation is the ideal procedure, if grafting is done at all; the only question to be settled is, whether such grafts usually live, and whether the process of healing is assured and quickened thereby. The operation is not difficult (after a little experience), and it is certainly better for all concerned than any kind of secondary grafting, provided it can be shown to be successful.

There are said to be two principal objections to primary grafting.

First, skin does not adhere well to bare bone, and little patches of granulations should be present, if life to the graft is to be confidently expected.

Second, when all necrosed bone is not removed at the mastoid operation, such centers of disease may create considerable disturbance to bone and meninges, if immediately covered over by grafted tissue.

The latter of these objections seems to us quite insignificant and unreal, as a thin graft of skin is hardly strong or stable enough to retain the products of bone necrosis. The former of these objections, however, seems to be more noteworthy in its character, and yet we have the evidence of such men as Dench, Hammond, Welty and others, to the effect that they are increasingly satisfied with the success of primary skin grafting. We are of the opinion, therefore, that mastoid operators should, by personal experience, convince themselves as to the utility of grafting, and should be quite sure of the ineffectiveness of primary grafting before dooming it to abandonment. If primary grafts do usually live, and if they shorten the healing process, they certainly possess the advantageous quality of rendering unnecessary secondary surgical procedures. We, therefore, urge that they be tried first, and be abandoned only for good reasons, especially as it is just as easy to insert primary as secondary grafts—indeed, the process is practically identically the same.

The points to be emphasized in ordinary primary skin grafting are as follows:

First, remove all necrosis and make the cavity as smooth as possible.

Second, remove all possible soft tissue from the inner wall of the tympanic cavity.

Third, thoroughly curette the eustachian tube as far as the isthmus, and rim out its tympanic orifice.

Fourth, stop all bleeding and oozing by forceps, pressure, firm packing, peroxid of hydrogen, hot water, hot one per cent solution of the chlorid of calcium, adrenalin, patient waiting, etc. Neglect of this direction will spell failure.

Fifth, large thin grafts should be cut and floated from the razor, cut side down, to a glass slide, by warm salt solution and a needle, keeping the edges uncurled, if possible. Some operators float the grafts in a basin of warm salt solution, cut side down, and pick them up on a spatula or glass slide just before using.

The body area from which the graft is to be cut should, of course, previously have been thoroughly cleaned with normal saline solution and soap, and bandaged.

Sixth, the graft should be slid from the glass slide by means of normal salt solution moisture and a needle or other suitable instrument, being careful to frequently smooth out the curled-in edges of the graft. It is better to line the anterior and interior portions of the cavity first, and then add more grafts as seen necessary.

A portion of the graft should be firmly tucked into the eustachian tube. The slight overlapping of one graft by another is harmless; the overlapped portion will simply slough off. The curling in of the edges of the graft cannot always be controlled, and a graft need not be condemned on this account.

Milligan proposes a rather novel method of placing the grafts. He fills the cavity with a warm salt solution and floats a large graft upon it, cut surface down. He then sucks out the salt solution by means of a pipette, and steers the graft into position with a needle or some similar instrument. He claims there is less tendency for the edges to curl, and that it is easier to place the graft.

Whatever means is adopted to place the grafts, care must be taken that they lie as smoothly as possible, and that they come into direct contact with the bone. The smooth pointed needle, or a smooth rounded probe, or instrument, such as suggested by Ballance, are best adapted for this purpose. The instrument should pack down, but not displace the graft. Blood, or other moisture, or air, will sometimes accumulate under the graft, and may be sucked out by the careful use of a curve pointed pipette.

It seems better not to graft the posterior and lower portions of the cavity, as it produces too large a cavity. Besides this, these portions of the excavation heal rapidly through the agency of well made meatal flaps. The important thing is to cover as much as possible, the tegmen, attic, tympanum and antrum, so that these diseased centers which are remote from the meatal flap may be speedily covered with new and healthy tissue. We materially assist in the dermatization of the upper portion of the cavity by the nature of our flap. It is a modified Panse flap. Panse split the meatus in the middle; we split it as far down as possible, thus giving all the flap to the upper wall; the lower does not need a flap, it takes care of itself, and always skins over. Our flap is an L flap; Panse's flap is a T flap. That is all the difference. The Allport divulsor enables one to make the split accurately, wherever it is desired.

Philip Hammond, of Boston, has lately been using a method of applying a graft to the mastoid cavity that commended itself to our reason as being simple and efficient. We will use his own words to describe the procedure: "A large thin graft, two inches or more square, is cut from the thigh with an ordinary amputating knife. The skin is immediately spread out on the place from which it was cut, exactly as if it had not been severed from its attachments. A square of crepe de lise is then laid on it, and the skin and crepe together removed from the thigh. This simple device absolutely prevents rolling or curling of the edges. A piece of ordinary gauze—or, rather, several layers which have previously been rolled into a cone, are then placed under one corner of the crepe and skin, in such a manner that the entire apex of the cone and at least one side is completely covered with skin, the raw side out. One side of the cone is purposely left free of skin, as this side goes into apposition with the anterior wall of the canal, which is already covered with epidermis. The cone, or plug, is then introduced through the meatus, the point guided toward the middle ear, and then the gauze of the plug gradually fed into the cavity, expanding and completely filling it.

"It must be remembered that the graft is adherent to a thin, smooth, silky crepe, and the pressure of the mass of gauze causes this to reach every part of the cavity, even where the meatus is much smaller than the inside, the gauze expanding in much the way that a bristle probang does. This gauze is allowed to remain undisturbed three or four days, at the end of which time it is gently removed. The crepe de lise comes with it, but the skin never. In the interval it has become firmly attached to all denuded surface. There are naturally some loose ends where the graft is superimposed upon the epidermis of the meatus, and there are necessarily reduplications or folds in the graft, as it is impossible to adapt a flat surface to the inside of a sphere without such. These loose pieces finally slough out, and during the process there is a very active suppuration to deal with. In most of the cases the superficial layers of graft are cast off, but underneath there is the firm pink appearance of new skin, rapidly paling out. Immediately following the removal of the gauze plug it is possible to demonstrate that the graft has 'taken' by pulling upon it. It stands a very considerable strain, and if we succeed in detaching a piece, it causes bleeding, showing that it is definitely attached to its new resting place."

We would say, that "crepe de lise" is a thin, silky goods that can be purchased at any good dry goods store.

Concerning the steps to be taken after the graft (or grafts) has been placed in position, it is, of course, evident that if Hammond's method is used, no other packing is required, as the gauze which is introduced with the graft, and its crepe de lise backing, will be quite sufficient.

If, however, this method is not used, most operators resort to small cotton pellets, thoroughly dusted with something like aristol or xeroform. Thorough dryness favors the life of the graft. The number of pellets used should be noted, as this is of assistance in feeling certain that all have later been removed. The first pellet should be placed in the anterior inferior angle of the cavity, in the vicinity of the eustachian tube, and each pellet should be carefully placed so as not to disturb the graft, which can, of course, be most easily displaced. When the cavity is filled, a strip of greased gauze should be placed over the pellets and its end brought through the meatus and the wound sutured.

Some operators have peculiar methods of their own in preserving the grafts. Politzer, for instance, covers the grafted area entirely with tin foil; while Ballance uses very fine gold foil instead; Reinhard uses fine silk tissue as a covering. Some use pure cotton for pellets, while others cover the little pellets with gauze. Denker uses no pellets at all, but merely drops a little loose cotton into the cavity, which is removed at the first dressing; others use loose gauze.

Unless otherwise indicated, it is recommended that the pellets should remain undisturbed for from five to seven days, at which time the packing should be gently soaked with peroxid of hydrogen, and all loose pellets removed. No force should be exerted. The cavity should now be gently syringed with a mild, warm, antiseptic solution, and then gently and loosely packed with greased or dry gauze. There is usually much odor present at the first dressing, and perhaps at the first two or three dressings, owing to the death of unadhered skin; but this soon passes away. After the odor subsides and the pellets, and gold, tin or silk coverings have been gradually and carefully removed, as little syringing should be done as possible, the cavity daily treated after the dry method, and kept powdered with boracic acid powder packings. As soon as possible all packings should be suspended, as any pressure is detrimental to the life of the graft. In cleansing the cavity at the first dressing, all of the grafts may be alive, or some of them may be dead; but at all events, even if a graft is dead when it is removed, a little island of new epithelium will usually be found underneath it, from which dermatization will proceed. In such cases of partial failure, subsequent grafting of small patches can be easily accomplished through the meatus. At all events, and under almost any circumstances, the process of healing will be probably hastened by any kind of a proper grafting process.

To Ballance must be given the credit of bringing prominently into notice systematic secondary grafting. He performs the original operation, and closes the wound with sutures. In ten days he opens the wound (after several thorough cleansings), and takes great care not to injure the newformed granulations, or the newly attached meatal flap. The bleeding and oozing are stopped by hot water, adrenalin, etc., and then the large thin graft (or grafts) is placed, as has already been described. Ballance's use of gold foil, cotton pellets, etc., has also been mentioned. He then sutures, etc., and does not disturb the wound for one week, when it is gently dressed, removing such packings, etc., as come away easily. Subsequent dressings are made every two or three days. We have seen Ballance's results, and it is most satisfactory to see how beautifully and almost invariably the grafts live. But there is, of course, the great objection to the secondary anesthesia and operation.

Some operators believe that no graft should be placed over the inner tympanic wall, because of the possibility of deafness resulting from covering the oval and round windows; others believe in covering the wall, but leaving an aperture through the graft to accommodate the oval window. The general consensus of opinion, however, is that, if great care is taken to place a graft over the inner tympanic wall that is exceedingly thin, its presence will not impair hearing, but may even improve it. Milligan has collected one hundred cases of grafting after radical mastoid operations, and has tested them all carefully, both before and after operation, and has kept most of them under observation for months and years. His results showed sixty-four per cent materially improved in hearing, twenty-four per cent unimproved, and twelve per cent were made worse. Milligan is not alone in his conclusions; they are shared by many experienced surgeons.

There is no diversity of opinion as to whether exposed brain or sinus dura should be covered by a graft or not. Many surgeons advocate covering these soft tissues with a graft, provided they are reasonably certain that all diseased conditions have been removed. Most surgeons think, however, that while there is no objection to grafting on bone, that when the brain or sinus are exposed, it is better not to attempt to cover them with grafts but to leave these areas uncovered.

Certain surgeons have devised peculiar methods of securing grafts, that are interesting if not useful. For instance, Waggett varnishes the grafting surface with "Newskin," which, he claims, prevents curling of the edges and favors an easy manipulation of the graft. Wingrave uses, in the same way, a ten per cent solution of acetone in collodion. Deanesly uses sticking plaster on the skin before making the graft. Any or all of these methods may not only be interesting but useful, but we have had no experience with any of them, and so cannot express an opinion

Any radical mastoid operation, with or without grafting, will be followed, more or less, for some time by an accumulation of débris, consisting mostly of desquamated epithelium, especially in the most concaved and remote portions of the bony crater. These accumulations do not mean that the case is not cured; it means that the new skin is thin and poorly nourished, and throws off scales, etc., which, if not cared for from time to time, will provoke a pus deposit and present a most undesirable appearance. These cases should be thoroughly cleansed from time to time by syringing, etc., and a two per cent solution of salicylic acid in alcohol freely poured in the ear. Such conditions will gradually pass away, as the health of the new skin becomes established, but while it lasts the ear should be cared for, as just described.

About six months ago we resolved to give the method of grafting used by Philip Hammond, of Boston, a fair trial in selected cases. This method appealed to us as being an efficient and comparatively simple one. We have used it in six cases, and herewith beg to submit our results as far as we have gone:

Case 1.—Girl, aged six years. Right ear. Foul discharge for two years. Adenoids removed. Ear treatment used for two months. No result. Radical mastoid operation performed, with Hammond's skin graft. First dressing in five days. Foul odor and much discharge. Part of the graft adhered, and part came away. Subsequent dressings were done every other day for two weeks, and then once a day. Healing occurred in about the usual time, namely, eight weeks.

Case 2.—Girl, aged seven years. Left ear. Discharge for four years. Very foul odor. Two months' treatment of no avail. Radical operation performed. Hammond's graft used. First dressing on fifth day. Slight discharge and odor. Entire graft preserved. Subsequent dressings every other day for two weeks, and then every day. Case cured in one month.

Case 3.—Boy, aged five years. Right ear. Foul discharge. Adenoids removed. Mastoid pain and tenderness. Radical operation. Hammond graft. First dressing on fifth day. Much discharge and odor. Entire graft came away. Healing in about ten weeks.

Case 4.—Girl, aged five years. Right ear. Discharge very foul for one year. Some surgeon had performed an acute mastoid operation about one year ago, but discharge continued. Adenoids removed. Treatment for two months availed nothing. Radical operation. Hammond graft. First dressing in five days. Some graft remained. Healing in five weeks.

Case 5.—Boy, aged six years. Right ear. Foul discharge for two years. Two months' treatment. No result. Adenoids removed. Radical operation. Hammond graft. First dressing on third day. Slight odor and discharge. Graft entirely saved. Left hospital on tenth day. This boy came from filthy and shiftless surroundings. The importance of postoperative care could not be taught. Did not see boy for seven days after leaving hospital, and after this constant care was impossible. At one dressing, two flies, one flea, and a bedbug were found in the ear. We are confident if this case could be properly cared for, a cure could be effected, but as it is, the case seems hopeless; but the graft was a success.

Case 6.—Girl, aged ten years. Left ear. Foul discharge for seven years. Cholesteatoma. Adenoids removed. Radical operation. Hammond graft. Graft was thick, but it adhered well. First dressing in three days. Cure in four weeks.

It seems difficult to secure ideal grafts of proper size and thinness. This, however, can be overcome by a proper razor and experience. Some surgeons feel that grafts will not stand much handling, but this has not been our experience. While, of course, we advocate care in handling grafts, it may be said that the graft, in our series of six cases, which did the best, was the one which was subjected to the most manipulation. This was in case 6, where, owing to the bad conduct of the patient under anesthesia, considerable haste was observed in operating. In consequence, a thick graft was cut, with considerable subcutaneous tissue attached. This tissue was cut off by scissors and scraped off by a scalpel. Manifestly, considerable violence was employed, and yet the graft lived completely, and the case was cured in four weeks.

We believe that the first dressing should be done in two or three days after the operation, instead of waiting five or six days, as most surgeons advocate. If done early, and with extreme care and delicacy, and without using any force whatever in withdrawing the packing, the cavity does not become so wet and foul as it does if five or six days are allowed to elapse. We believe also, that after the first dressing, subsequent dressings should be made every day. Of course, six cases are quite insufficient evidence upon which to base a dependable opinion, and yet they have distinctly encouraged us to continue, for a time at least, the use of the Hammond method of grafting, and we certainly are convinced that any doubts as to the livability of grafts on newly cut bone should be abandoned. All grafts but one lived more or less, and the time necessary for a cure certainly was shorter than our average cases, where no grafts were used.

SHORT TABULATED REPORT.

Case.	Did graft live?	Time of healing.
1.	Partly.	Eight weeks.
2.	Yes. Entirely.	Four weeks.
3.	Not at all.	Ten weeks.
4.	Partly.	Five weeks.
5.	Yes. Entirely.	Case uncured, owing to lack of parental coöperation.
6.	Yes. Entirely.	Four weeks.

SOCIETY PROCEEDINGS.

NEW YORK ACADEMY OF MEDICINE, SECTION ON OTOLOGY.

Meeting of December 3, 1914.

Metastatic Conditions Complicating Suppurative Otitis Media, With Especial Reference to Secondary Inflammatory Processes in the Joints.

Dr. Seymour Oppenheimer calls attention to the general symptomatology common to all cases of infective thrombosis, and in addition cites those characteristics of metastases located in the chest, the abdomen, the cranial cavity or the joints.

Cases are observed with so slight a clinical picture from the ear, that because of the temperature curve, they are wrongly diagnosed as typhoid fever. The author saw two cases, thus admitted to the medical service, in which, however, positive blood cultures eventually led to a correct appreciation of the lesions, and sinus thromboses were discovered and operated upon.

The author is inclined to regard endocranial complicating lesions, not in the light of true metastasis, but rather as lesions produced by contiguity. Regarding endocarditis, he points out the difficulty of recognizing this condition before death, and cites two cases in point which terminated fatally. He refers to the cases of hepatic abscess reported by McCuen Smith, who, however, did not demonstrate the presence of thromboses in his cases, nor give the report on blood examinations. Oppenheimer is at a loss to explain these cases as metastatic lesions, unless sinus thrombosis and a general bacteremia is conceded. So, also, cases of appendicular inflammation are to be explained. He saw three cases of acute gall bladder inflammation which supervened within two weeks after acute mastoiditis. No thrombosis was found, however, and no blood cultures were taken.

Arriving at the question of particular moment in his paper, Oppenheimer draws attention to cases of joint inflammation which resemble acute rheumatism, and which, not infrequently, occur in infective thrombosis. One or several joints, either with or without pus formation, is presented. Usually the characteristic symptoms pointing to an otitic basis are found, although it is noteworthy that the ear symptoms are of a very mild degree.

Acute articular rheumatism is conceded to be a disease, sui generis, of an infectious nature, whose causation is still a mooted question. When joints are involved, a number are affected, and the disease travels from one to another, seldom tending toward true pus formation. The peri- and endocardium are often involved. Rheumatism shows a tendency toward hereditary characteristics, toward relapses, and it tends to react to specific chemical agents. However, different views are held regarding rheumatism, and some of these Oppenheimer cites, conceding the common observation, that the most varied types of microorganisms are able to produce the typical picture of acute articular rheumatism. Finally, the author refers to the animal experiments, the results of which undeniably demonstrated that weakened pyogenic cocci can and do produce a picture of articular rheumatism.

Oppenheimer contends that if it is conceded that a disease appearing in the guise of an acute articular rheumatism can be caused by pyogenic cocci, then this can only take place provided such microorganisms find entrance into the blood stream in a weakened form; otherwise they would produce an entirely different clinical picture, namely, pyemia with abscess formation.

From all of the above, Oppenheimer concludes that we can comprehend how symptoms of joint inflammation may present as a complicating lesion and an overshadowing picture to a middle ear suppuration—the symptoms from the joint being so prominent as to completely obscure the original causative disease. He cites the following cases in point:

Case 1.—F. M., aged thirty-four years. A right-sided otitis media, which after myringotomy presented a scanty discharge for ten days. After one month suffered chills and rises of temperature and swelling of left knee. Ten days later the knee was pronounced to be a secondary arthritis.

Patient now is septic. There is no aural discharge, no mastoid tenderness, and no intratympanic evidence of mastoiditis. Some submaxillary and cervical lymph node enlargement. Left knee joint presents an acute synovitis and periarthritis. Blood culture positive in twenty-four hours, with forty-five colonies of streptococci.

The affected knee joint aspirated, evacuating a large amount of yellowish purulent material containing streptococci. Mastoid exenterated, sinus explored, and thromboses demonstrated. Jugular ligated and exsected. Repeated cultures from blood gave progressively lessening numbers of colonies to the cubic centimeter.

Ten days after sinus operation, temperature again rose to 103°, and pain and swelling appeared in the left shoulder. Patient died fifteen days after sinus operation.

Noteworthy among the portmortem findings was the evidence of vegetations on the mitral heart valve, smears from which gave streptococcus.

Case 2.—Female, forty-nine years of age. Chronic aural discharge for fifteen years, which ceased three months prior to coming under observation, at the time when a postauricular swelling presented. This swelling was reduced by local applications. One month later the ankle joint began to swell and, upon examination by patient's physician, a peri- and endocarditis with pleural exudate was found. Three weeks later the swelling of the ankle subsided, but recurrence took place after patient went to work. The patient then had dyspnea in addition.

Suddenly there presented itself pain in the ear and a chill and a rise of temperature to 104°. The next day a second chill and rise of temperature.

The local examination gave membrana tympani absent, some granulations in the middle ear, and slight odorous discharge. Mastoid not sensitive. . No choked disc.

The operative findings revealed an extensive destruction of the inner table, particularly of the posterior fossa wall, with a large perisinus abscess. Sinus thrombosis demonstrable. Jugular exsected.

The patient progressed favorably for two weeks, and then symptoms of cerebellar abscess manifested themselves and a large occipital lobe abscess was evacuated. Death followed. No autopsy.

Case 3.—Female, aged fourteen years. Admitted to hospital with diagnosis of acute articular rheumatism, which followed shortly after an acute suppurative otitis media. There was a history of an acute aural suppuration, lasting four weeks, which had occurred two months previously. For one month, chills almost daily, high temperature, sweating, and headache. Swelling of phalanges of left hand and of left hip joint and stiffness of neck. Blood culture positive. Examination shows absence of aural discharge, no mastoid tenderness. Beginning optic neuritis. Operative findings demonstrated a purulent thrombus in the sigmoid sinus and upper part of the jugular vein.

Case 4.—A. L., aged seventeen years. Came under observation with a very slight postinfluenzal, acute suppurative otitis media, the bacterial flora of which proved to be the streptococcus mucosus. Ten days later ear symptoms ceased, but a few days thereafter pain and swelling in the phalanges and wrist of the left hand developed, to be followed within a week by rapid development of involvement in both knees, both elbows, right hip and right shoulder joints. Aspiration of knee and shoulder joints, but no bacteria recovered. A severe bronchitis also developed. This condition continued for six weeks, during which time no ear symptoms presented; then mastoid tenderness, a sharp chill and temperature of 103°. The membrana tympani was intact, thickened and reddened. Tenderness and edema over mastoid. The operative findings give evidence of a beginning perforation of mastoid cortex and destruction of internal plate. Pus from mastoid gave streptococcus mucosus. Septic thrombus extending from sinus into bulb and into jugular to level of the thyroid vein. Jugular exsected. The patient recovered.

Case 5.—Male, four years old. Under treatment of his physician with swollen ankle, knee and both shoulder joints. Temperature varying from 99° to 102° +. Complains of pain in ear and shows a slight swelling of auditory canal. The mastoid slightly sensitive, and a scant amount of foul smelling discharge present. Ossicles absent. The patient has a chronic aural suppuration. The temperature is now 105°, preceded by chilly sensations. Operative findings demonstrate a sclerotic mastoid, no free pus; sinus plate necrotic, and sinus covered by thick exudate and granulations. The sinus contained a firm, white, apparently well organized thrombus, streptococci being demonstrated in thrombus and vein wall. Jugular exsected. Patient recovered.

These case histories demonstrate that an otitic sinus thrombosis may be masked by the symptoms of an acute arthritis. Oppenheimer believes that the toxins from the original infection are to be considered as the causal agents of the bacteria-free joint exudates, and he holds it superfluous to raise and discuss the question as to whether the joint involvements were primary, or whether they were truly sequelæ of the ear lesions.

The author concludes that if after an acute otitis, or during the course of a chronic suppurative otitis, symptoms of acute arthritis supervene, these must not be considered as primary, but should be looked upon as secondary metastatic complications resulting from an infective otitic phlebitis and associated general bacteremia.

He does not preclude the possibility of secondary joint lesions which follow a recognized ear lesion and sinus thrombosis, but draws attention to the fact that here another class of cases, different from those under discussion, is being dealt with. General practitioners of medicine should realize that an ear disease with a clinical picture and a symptomatology of so slight a nature as to be almost overlooked, may produce joint symptoms with a stormy clinical picture, and meanwhile the original lesion progresses and endangers the patient's life. In all joint lesions with a history of aural trouble, the possibility of these facts should be kept in view, so that a sinus thrombosis may not be overlooked.

DISCUSSION.

Dr. John Rogers remarked that in his experience multiple suppurative processes of inflammation or pyemia following ear infections were quite rare. When this calamity did occur, it was well recognized by surgeons that the primary source of the disturbance must always be sought and relieved. In the presence of suppuration in the middle ear, this means that a radical mastoid operation must be performed at the same time that the abscesses in the joints or elsewhere are opened and drained. These pyemic conditions of severe grade are much less difficult to diagnose than those of milder form which now pass under the designation of polyarticular rheumatism. There can be little doubt at present that a great many nonsuppurative and multiple inflammations of joints have a bacterial origin. They seem to be due to what is virtually a pyemic process, or an inflammation from some mildly pathogenic organism which originates in one of the many possible primary foci in the head, or genitourinary, or alimentary tract, and thence travels by the blood, with or without the intermediation of the lymphatics, to the joints.

The diagnosis in these cases is by no means easy, as in addition to the subacute or comparatively mild articular infections, there are many others which can only be explained as noninfectious or metabolic. To increase the difficulties of diagnosis, some of the chronic lesions of joints or cases of chronic rheumatism are strongly suspected of having a bacterial metastatic origin. Arthritis deformans, and even the Charcot joint, may belong in this class. As yet there is no method of accurately differentiating the pyemic from the metabolic arthritis; hence, in treatment, the best we can do is to search the body carefully for all possible sources of infection, and the ear is too often overlooked. Dr. Oppenheimer had pointed out that infection may exist in this region and give so few symptoms that it may readily be forgotten. If, however, any infection in the middle ear is present in conjunction with a socalled rheumatism, the offending organism can sometimes be isolated and an autogenous vaccine prepared.

Dr. Rogers said that his personal experiences, as regards the successful use of this form of therapeutics, had not been very encouraging, possibly because he had never been able to accurately differentiate the different forms of "polyarticular rheumatism"; for there is at least one of these acute or subacute joint diseases in which no bacterial contamination has been detected—i. e., the "rheumatism" which is characterized by the presence of the socalled Aschoff bodies in the heart, and which appears to be of metabolic rather than bacterial origin.

Vaccine therapy for polyarticular, nonsuppurative inflammation is thus a rather hit or miss treatment—at least, at present—but it is the best which we possess. It is indicated only when there is discoverable some possible single focus of infection like an acute or chronic middle ear disease. Vaccine therapy is not indicated when no primary focus can be found, and hence the injection of the now popular socalled "phylacogen" mixture of organisms is seldom or never justifiable.

DR. EAGLETON said that personally he had had but one case in which the symptoms of joint involvement had overshadowed the ear condition. In all the other cases the ear was so obviously the cause of the infection that there was no doubt as to the diagnosis.

Dr. Oppenheimer had said that all the involvements of cerebral tissue were by direct continuity. Dr. Eagleton said that he had had one case which showed that this might not be so.

Dr. Eagleton said that the question of what to do for these joint involvements after a sinus thrombosis was one which had long interested him; years ago he had had an experience which had influenced his views on treatment ever since. The patient was a child who had complained of severe pain in its knee before the diagnosis of sinus thrombosis was made, but was operated upon for the thrombosis without paying any attention to the joint involvement. Two days later the pain became very severe, the temperature continued high, and it was discovered that one of the joints was involved, and an extension apparatus was employed. It was found that one knee had been dislocated; a week later the other hip became dislocated, and the child recovered with a permanently damaged hip. This case so impressed him that he made up his mind that in all cases of joint involvement, no matter whether it was thought to have fluctuation or not, he would aspirate the joint, and he has followed that procedure ever since. The hip is so situated that one cannot tell whether or not there is effusion in the joint. If the smear from the aspiration shows pyogenic bacteria, the joint is immediately opened and irrigated and the wound closed. This procedure has uniformly resulted in complete restoration of function. On the other hand, if there are no bacteria in the joint, many of these cases will recover if the joint is immobilized. The danger of delay, however, is very great, and every case of joint involvement associated with sinus thrombosis should be aspirated to find out whether or not it contains bacteria.

Dr. La Fetra: During the period from January 1, 1913, to November 15, 1914, there were treated in the children's wards of Bellevue Hospital one hundred and seventy-seven cases of otitis media. Of these, one hundred and thirty-two were acute, and for their treatment single paracentesis was done in thirty-six cases, double paracentesis in sixty-six—making a total of one hundred and two which were operated upon. There was spontaneous opening, frequently before the patient entered the hospital, in twenty-eight cases. The opening was double in ten instances and single in eighteen. There was no opening and no paracentesis done in eight cases. Among all these one hundred and thirty-two instances of acute otitis media there occurred the following complications: Acute colitis, one case; postauricular adenitis, one case; pneumonia, ten cases; sinus meningitis, one case; septicemia with pericarditis and pleuritis, one case. In the case of serous meningitis the blood culture was negative throughout, and the cells in the spinal fluid numbered on the fourth day four hundred and eighty; on the fifth day, two hundred and sixty-two; on the seventh day, twenty; and on the eighth day, thirty-seven. The infant made a complete recovery. In the case of septicemia with pericarditis and pleuritis there was acute purulent otitis media involving both ears. The infant was only seven months old, and died as the result of the general poisoning, the termination having been due to a hemorrhagic infarct in the right lung. It is to be noted that there was not one single case of mastoid disease developing in these one hundred and thirty-two acute cases. My personal experience in private practice has led me to feel that with early and perhaps frequent opening of the drum membrane, mastoid complications in infants and young children should be exceedingly infrequent. In the past fifteen years I have had arise in my own practice only five cases of mastoid complication. In many instances there was fear of mastoid disease, and of course mastoid tenderness was very frequently met. I have had no experience either in the hospital or in private practice with the complication of sinus thrombosis, and the hospital case mentioned of general septicemia is the only one I have seen.

During the same period there were chronic cases of otitis media to the number of forty-five. Double paracentesis was done in one of them and single in three. There was no opening and no paracentesis in one instance, and there was spontaneous opening before entering the hospital in thirty-eight cases—double in twenty-two and single in sixteen. Among these forty-five chronic cases there was one instance of mastoiditis and one instance of temporosphenoidal abscess with no mastoid involvement. In this case the cerebrospinal fluid showed only five cells, but on account of the changes in the eye grounds, together with the general nervous symptoms, the diagnosis was made and the case was operated on at the New York Eye and Ear Infirmary.

Among the whole number of acute and chronic cases there was not a single instance of rheumatism or septic joints. It has seemed to me of interest to add in this discussion the number of cases of rheumatic fever and of sepsis treated in the hospital during the same period. During the years 1913-14 there were thirty-three cases of rheumatic fever. In one case the right drum was slightly congested and retracted; the left drum was normal. The ear symptoms were trifling and soon subsided. This patient had a hemolytic streptococcus blood, but at discharge this organism had disappeared and the drums were both normal.

During the same period there were treated in the wards thirty-three cases of valvular heart disease, some of which were acute, but most of which were chronic; one case of myocarditis and two cases of primary pericarditis. In none of these were there any symptoms or physical signs referable to the ear

There were ten cases of septicemia during the same period. Of these, one infant of four months had acute purulent otitis on the right side, and one infant eighteen days old had a double otitis with meningitis as part of the general septicemia.

Altogether, then, there were among the one hundred and seventy-seven cases of otitis one case of septicemia, none of joint involvement. Among the thirty-three rheumatic cases there was only one of mild otitis; and among the ten cases of septicemia there were two with otitis.

Dr. Guentzer said that in connection with the subject under discussion, he would report a case that had been under his observation for a few months during the summer. The patient was a girl, eight years of age, whose adenoids and tonsils had been removed two years previously. On account of repeated colds the family physician advised removal of remaining adenoid tissue, which was done on April 27, 1914.

On May 6th the patient came under Güntzer's observation, as she had complained of earache the previous day and during the night. The membrana tympani was bulging, and there was slight mastoid tenderness. A myringotomy was performed, followed by a free discharge for a few days. Culture showed streptococcus mucosus capsulatus. On May 11th, the tenderness having increased and the temperature being 102°, a mastoidectomy was performed at the hospital. The zygomatic cells were well developed, and the mastoid was filled with granulations. Again, the culture showed streptococcus mucosus capsulatus.

May 17th pus was evacuated from zygomatic region; for three days the temperature was fluctuating, and clinical symptoms of sinus thrombosis manifested themselves. Dr. John Richards saw the case, concurred in the diagnosis and advised jugular resection, which was done that evening.

May 20th, as there was no abatement of the septic temperature, the jugular bulb was explored, and pus was evacuated from that region. There was a distinct evening rise of temperature for nearly two weeks before a swelling of the right ankle joint appeared, with fluctuation. Both sides of joint region were incised (laterally) and drained.

On June 14th Dr. John Hartwell excised the astragalus, which was necrosed, and drained the joint through and through. On turning the child over, a bulging was found under the right scapular region. This was opened, pus evacuated; explored, and necrosis of wing of bone found.

On June 21st pus was evacuated from the right hip joint by Dr. Hartwell.

On July 11th Dr. Eugene Pool (for Dr. Hartwell, who had gone abroad) evacuated pus from behind the right hip joint and removed head of femur.

On July 15th the right femur was opened and pus evacuated from the medullary canal by Dr. Pool.

On August 12th there was a second opening and evacuation of pus from the right femur, below and behind.

During all this time the general condition of the patient varied. She had no chills, never vomited, and had no cerebral symptoms. She had paralysis of external rectus of left eye, with some edema of the disc, and diplopia, which entirely cleared up in about three weeks. During these five months, pressure necrosis of the skin occurred wherever there was bodily contact.

The occiput was exposed, every spinous process of the vertebra, the crest of the pelvic bones, the posterior aspect of nearly all the ribs, the heels, and the contact surfaces of the bones of both legs.

Later the urine showed albumin and casts—hyalin and granular. Various blood counts showed leucocytosis and increased polynuclears. The warm days in the early part of September caused a watery diarrhea, from which the patient never rallied (either toxic or compensatory, from poor kidney action). The child died on September 26, 1914.

Dr. Güntzer said that this was one of the most trying cases that ever came under his observation.

Dr. Pisek agreed with Dr. Oppenheimer, that we do encounter arthritic inflammation following pus pockets or foci, whether in the sinuses, tooth roots, or elsewhere. As to the term "rheumatism," he did not like it, particularly in this connection. The complication was an arthritis, suppurative or nonsuppurative, and had nothing to do with the socalled rheumatic fever.

There is still in the minds of some practitioners the idea that a true "rheumatism" follows scarlet fever. There is a complicating arthritis in a certain number of cases, but rarely is it suppurative. The condition is one that is not yet generally understood, and it is to be hoped that light will soon be thrown upon it. We do see in young children a pneumococcic arthritis that is said to be primary. Pfister and Herzog had done some very good work along this line, without finding any focus elsewhere; there was probably a hidden focus which was not disclosed—hence the value of such papers as the one heard tonight.

From the standpoint of the infectious disease, it seemed interesting in this connection to present the number of cases of arthritis and otitis which occurred in the New York City Hospital for Infectious Diseases. In the diphtheria pavilion there were nine hundred and thirty-four cases. Of these, eighty-three, or 8.8 per cent, had at some time an otitis; among them no case of arthritis developed. In the scarlet fever service there were one thousand and seventy-nine cases; two hundred and twenty-three had an otitis, i. e., 20.66 per cent. Among these were seventy-eight cases of arthritis—showing its more intimate connection with the streptococcus organism.

Collecting the cases for last year and this year, there were in all six thousand four hundred and eight cases of infectious diseases—scarlet fever, diphtheria, and measles—and of these six hundred and seventy-seven, or approximately ten per cent, had otitis. There were one hundred and twenty-eight cases of arthritis—or approximately two per cent; so that arthritis is not a common complication with scarlet fever, measles, and diphtheria cases.

The arthritis usually occurs in the second or third week of the disease, and when recognized and the joint immobilized it, as a rule, slowly subsides.

As Dr. La Fetra had said, in pediatric practice sinus thrombosis is comparatively uncommon in early life. Dr. Pisek himself had seen it in but one instance in the last three years, at the Willard Parker Hospital—a case that subsequently came to autopsy.

Dr. McKernon said that the subject had been very well covered, and he congratulated Dr. Oppenheimer on bringing it before the attention of the section. There can be no question that metastatic abscesses do occur, and occur late following a long suppuration. Formerly it was not recognized that they occur so frequently as we now know is the case. Those who see these cases of septic sinus thrombosis very frequently ask themselves why they do not occur oftener. It has seemed to him that an explanation might be found in the frequency on account of the activity or virulence of the organism, and also in the resistance of the patients. Another point is that where these metastatic conditions developed late, it was very strange that they did not develop earlier, for in all the cases he had seen of metastatic abscesses subsequent to disease of the sigmoid sinuses, they had followed shortly after the acute process had developed or had been recognized. In one case it was some six weeks following the onset of the acute middle ear condition, and the acute process cleared up. The infection developed in the parotid gland; it broke down, and there was a sinus communicating with the external canal; and when the child was brought for examination, the hip was anchylosed. The parents who brought it were told that the child required the attention of a general surgeon rather than of an aural surgeon. Later the abscess was opened and drained.

Dr. McKernon said that he was inclined to agree with Dr. Eagleton in reference to this kind of abscess, and believed that in every abscess of the joint following a suppurative sinus thrombosis, if examined carefully, a septic organism would be found present.

He again thanked Dr. Oppenheimer for bringing the matter to the attention of the section, for it was a very timely topic.

Dr. M. D. Lederman said that a year ago he had presented before the section a child, seven years of age, showing a complication of this character, where the joint trouble appeared a week after the operation for resection of the jugular vein following mastoid and sinus disease. The child had a severe otitis and high temperature, and developed a pneumonic process. In the face of the active inflammatory condition of the lung, the child had to be operated upon on account of the increasing sepsis, characteristic fluctuating temperature, and tenderness along the jugular vein. Metastatic abscesses of both ankle joints developed, and bacterial examination of the pus showed the same organism as was found in the mastoid disease. Two inches of the vein were resected. The child made a good recovery, after having been ill for three months, with prolonged septic temperature. Antistreptococcus vaccine was also used.

In another case which had been presented before the section, the patient—a young girl, fifteen years of age, pregnant three months—had a chronic process of the middle ear with complications of the sinus and vein, followed by infection of the lungs. An abscess developed in the lung, but fortunately the contents of the abscess were evacuated through the mouth. The same organism was found in the pulmonary discharge, as was seen in the aural discharge. This patient also developed an alveolar abscess later on. Her symptoms on admission to the hospital greatly resembled typhoid fever.

In another case in which the internal jugular was ligated following mastoid and sinus infection, a child showed symptoms of joint involvement which did not go on to suppuration.

All these cases had occurred in the last five years, which would seem to indicate that the condition is not so uncommon as some of the previous speakers believed. Two of these children came to Lebanon Hospital within three weeks of each other.

Dr. Leo B. Meyer, referring to the five cases of suppurative otitis media, with sinus thrombosis followed by pyemia, reported by Dr. Oppenheimer, said that it is not generally believed that such a joint suppuration could follow a suppurative otitis media without the intervention of sinus thrombosis. In one of the societies last year he presented an infant sixteen weeks old with suppuration of the knee joint. Though suppurative otitis media existed, the case was presented because of the marked sepsis and joint suppuration, with functional recovery of the joint. Dr. Oppenheimer had remarked that in ear suppurations when sepsis occurred, practically always a sinus thrombosis was also present. Dr. Meyer said that he was not familiar with the otologic aspects of the question, but on reference to the original article by Dr. Libman on bacteremia following otitis media, he found the statement that while he had never seen a case of general bacteremia following otitis media without the presence of a sinus thrombosis, and was not absolutely certain that this existed, he believed such cases had been reported in the literature. Especially in children did he believe this might occur. At any rate, this patient was an undoubted case of ear suppuration, with a suppuration of this particular joint and several metastatic abscesses, without a sign of sinus thrombosis, and the child recovered without an operation on its mastoid or sinus.

Dr. Sayre said that he had seen several cases of arthritis of the upper cervical vertebræ, following mastoid operations. These cases were frequently mistaken for torticollis, on account of the position in which the head was held, but they were undoubtedly metastatic infections of the second and third cervical vertebræ from suppurating ears, just as we see them from suppurating tonsils. One of these cases had been referred to him by Dr. Kerrison, who had thought it of sufficient interest to report to the society. Dr. Sayre said he did not know whether or not in this case there had been sinus thrombosis.

Dr. Matthews said that his work was with the ears and not with the joints. He recognized the occurrence of these conditions of the middle ear and mastoid along with other general infections, but was not prepared to speak in regard to the percentage of their frequency.

Dr. Sperry said that he had had two or three cases that were similar to those that had been related by the other men. In one case of sinus thrombosis in a child six years of age, the child died with a multiple arthritis, and a large suppurating focus in the elbow joint. He expressed his enjoyment of the paper, and thought it was a very timely one.

Dr. Norton Wilson said that it was easy to see how the cases of metastatic involvement occurred when a thrombosis of the lateral sinus exists, but that it was not so easy to understand when there was only a simple otitis media. He had always felt that the latter class of cases must have gone through the lymphatics and involved the joints, or heart, or kidneys, just as it does by way of the tonsil.

NEW YORK ACADEMY OF MEDICINE, SECTION ON OTOLOGY.

Meeting of January 8, 1915.

Tubercular Otitis.

DR. JOHN A. ROBINSON: Eighteen months ago the patient came to the New York Eye and Ear Infirmary, complaining of constant tinnitus in the left ear and slight deafness. Inspection showed a small yellowish spot at the tip of the malleus. No fluid in tympanic cavity. The patient had a tubercular lesion of both apices. He was kept under observation for four months, the spot gradually increasing in size until it was about one-eighth of an inch in diameter; then a spontaneous perforation occurred without pain. The tubercle broke down, leaving a fairly clean kidney shaped perforation. No tendency to granulation; no regeneration. Discharge scanty. Ear at times has been dry. Smear showed a mixed infection. No guinea pig inoculation made. The tinnitus ceased with the perforation.

DISCUSSION.

DR. HARRIS said that the case presented by Dr. Robinson was particularly interesting for several reasons. One was that attention was first directed to the condition by the tinnitus, and not by other symptoms. So far as pain is concerned, all recognize that it is not a characteristic of tubercular middle ear disease. He recalled one case, however, which showed a marked exception to this rule. The man was a patient of Dr. Forbes, whom he had seen in consultation some years ago and had a case of tuberculosis of the middle ear accompanied with the most excruciating pain. Dr. Harris said that he had never seen a case that suffered more, or in which he himself had suffered more because of the patient's suffering. It was an advanced case of pulmonary tuberculosis, and operation upon the ear was out of the question; the suffering was most profound and continuous, and extended over days and weeks, until all, including the patient, welcomed death.

It was the only case in his entire experience where there was such suffering in a case of tuberculosis of the middle ear and mastoid; but it would be well to keep it in mind as an illustration of the fact that pain can be present in tuberculosis of the ear.

An Obscure Case of Mastoiditis—Streptococcemia—Operation—Recovery.

DR. WILLIAM WESLEY CARTER: The following case from my service in Gouverneur Hospital seemed to me of sufficient interest to place on record:

A school girl, nine years of age, gave the following history on being admitted to the hospital on October 27th in the service of Dr. Francis Huber. Four days prior to admission she had been seized with a violent pain in the throat; this was accompanied by high fever and vomiting.

Examination at time of admission showed a follicular tonsillitis. Two days later the exudate on the tonsils, which at first was abundant, had almost disappeared. In the meantime the patient complained of pain in the right ear. This soon subsided without suppuration. The girl, however, seemed very ill; her prostration being altogether out of proportion to the severity of the tonsillar attack, and it was very evident that a complication had assumed first importance in the clinical picture. The patient at times was actively delirious, and the temperature ranged each day between 106° and normal: the time of highest temperature was 9:00 a. m. and 9:00 p. m., the lowest temperature being recorded at 1:00 p. m. The respiration and pulse kept pace with the temperature, the former ranging between 28 and 38 and the latter between 116 and 148.

On Ocotber 31st, four days after admission to the hospital, and eight days after the beginning of the attack, she was transferred to my service.

At 10:00 a. m., October 31st, the following clinical observations were made: Patient appears very ill indeed, is dull and apathetic. Temperature, 104°; respirations, 28; pulse, 124.

Examination of Throat.—Pharynx congested, tonsils swollen, some exudation in crypts.

Ears.—Left, apparently normal. Right, slight redness and swelling of Shrapnel's membrane and extending along the posterior wall of the canal. No perforation of the drum. There was no swelling over the mastoid, and no tenderness could be elicited by firm pressure over the bone.

Physical examination of the heart and lungs revealed nothing of importance.

The second metatarsal joint of the right little finger was swollen, red and shiny, and exquisitely sensitive. There were no other evidences of metastatic involvement.

The following reports had been received from the laboratory:

Urine cloudy; specific gravity 1015, neutral, trace of albumin, pus cells, granular casts.

Culture from throat negative for Klebs-Loeffler.

Blood examination for plasmodium, negative. Leucocytes, 22,500; polynuclears, seventy-eight per cent. Blood culture shows presence of streptococci.

Spinal puncture, fluid under normal pressure, clear. A culture of this showed subsequently that it was sterile.

In view of the above findings, the history of tonsillitis, the pronounced leucocytosis, the metastasis in the joint, the streptococcemia and the general appearance of the patient, we decided at once that her desperate condition was due to the streptococcic invasion of the blood stream.

The redness over Shrapnel's membrane and along the posterior superior canal wall pointed to the right mastoid as the probable source of the invasion. An immediate operation, therefore, was advised. As permission had to be obtained, this was not performed until 10:00 o'clock that night. At this time the patient's general condition was very bad and the outcome was considered doubtful.

A simple mastoid operation was performed. The antrum and the mastoid cells down to the tip were found filled with serosanguinous pus. The bony wall of the sinus was removed, but as the sinus appeared to be normal, it was decided not to open it, but to await early developments.

The day after the operation the clinical picture was entirely changed; the temperature dropped abruptly to normal and remained so. Recovery was prompt and convalescence uninterrupted. The metastatic joint subsided without suppuration.

The patient was discharged from the hospital eleven days after the operation, and the mastoid wound was completely healed a week later.

The features of the case to which your attention is especially directed are:

1. The desperate condition of the patient.
2. The slight objective signs of mastoiditis. (There being no tenderness over the mastoid.)
3. The metastatic involvement of the joint.
4. The pronounced leucocytosis and bacteremia.
5. The extensive involvement of the mastoid found at operation.
6. The fact that the sinus was not opened.
7. The rapid recovery of the patient.

DISCUSSION.

Dr. Phillips asked if Dr. Carter thought the case a purely sinus condition. It seemed to him that the tonsillitis would explain the involvement, rather than the ear.

Dr. Guttman asked what Dr. Carter meant by the expression serosanguinous pus.

Dr. Carter, replying to Dr. Phillips, said he thought it likely that the source of the metastasis was the tonsils, because when the patient came under observation the metastatic joint was very well developed—swollen, red, and shiny—and the child had been complaining of it for twenty-four hours before she was seen. The bacteremia may have been from the tonsillar infection, for there was nothing in the mastoid that pointed to invasion from that source into the sinus, for the sinus wall was apparently healthy. However, the tonsillitis had subsided at the time of the operation, and it seemed rather extraordinary that the temperature and all the other symptoms should so promptly subside after the operation, which would seem to lead to the belief that the infection of the blood was from the mastoid process. Whether the infection passed through the sinus, through the emissary vein, or through some other vein in close contact, it would, of course, be impossible to say. The extraordinary point was that the condition subsided so quickly after the mastoid was operated upon.

The term serosanguinous pus explained itself. It was a combination of serum, pus, and blood.

Dr. Harris said that it was an extremely interesting subject, but if the case was going on record as a streptococcic blood infection cured by a simple mastoid operation, it should be clearly so understood. He would like to know from Dr. Dwyer, if in his wide experience it would be regarded as a unique case. According to the history, the temperature of the child dropped almost immediately after the operation.

Dr. Dwyer said that the unique point was that Dr. Carter went ahead and did the sinus and jugular operation. There seemed no doubt that the condition was due to the tonsillitis, and that the mastoid was a secondary condition lighting up and keeping up the symptoms.

All of these questions have been worked out very well by Rosenau simply by taking out the tonsils after an acute streptococcemia, or where the tonsils were very much infected, taking a culture from the capsules and injecting rabbits. He was able to reproduce the same culture as in the human being; and with rabbits he absolutely demonstrated the streptococcus in long chains, which is a parallel with Dr. Carter's case.

Dr. Phillips said that what he had really meant to infer was that it seemed to him that the operation on the mastoid had nothing whatever to do with the cessation of the symptoms. It seemed probable that the disease was taking care of itself and would have subsided had the mastoid not been opened. It was probably one of many such cases that all have seen which have a few symptoms and recover without any operation. It was difficult to understand an infection of a very serious type that would not produce more symptoms. The disease had probably reached its climax and would have recovered spontaneously.

Dr. Carter responded that the same might be said about any patient that got well after any operation. He had not especially emphasized the fact, but the patient was very ill indeed, and the parents were told that in all probability the child would not recover. That the recovery should have begun immediately after the operation was, to say the least, a very striking coincidence. He was convinced in his own mind—and it would require a good deal of substantial argument to change his opinion—that the patient's recovery was due to the removal of the infected mastoid cells.

Dr. Kopetzky said that he thought Dr. Carter was partly right, and that he himself had just seen a patient who presented an almost parallel case. Dr. Carter's procedure had doubtless a great deal to do with the recovery of the patient. As he heard the history and compared it with the case he had just seen, it seemed that the case was one of septic sinus thrombosis; the streptococcemia was due to that; the type of mastoiditis which preceded the vein lesion was one which would bring a sinus thrombosis in its train. Dr. Carter opened the mastoid process and exposed the sinus and gave the lumen a chance to expand, and the one peculiar and particular factor which caused the fomation of a thrombus was removed, namely, compression. It was not an obliterating thrombosis, and the patient recovered, owing to the relief of the pressure.

All are acquainted with Rosenau's work. You don't have to take streptococcus or staphylococcus from a tonsil. Any organism made into an emulsion and injected will show a predilection for joint involvement. Dr. Carter's case was a spontaneous cure of a parietal thrombosis by the removal of pressure on the outside. Dr. Körner had recorded a number of such cases, in some of which he had proceeded exactly as Dr. Carter had, and he, too, reported good results from this limited procedure.

Dr. Carter, in closing, expressed his gratification at Dr. Kopetzky's explanation of the condition, which seemed to him very probable. He said that he still believed that the recovery of the patient was due to the operation, and in view of the clinical history of the case, did not understand how it could be attributed to anything else.

A Case of Brain Abscess.

Dr. Frank T. Hopkins: This case of brain abscess occurred in October at the New York Eye and Ear Infirmary, in the service of Dr. Dench, and came under my care.

The patient entered the hospital with a history of one month's ear trouble, but having had a discharge for only two weeks. A sagging canal wall and a tender mastoid showed the need of immediate operation.

The temperature was 100° (R.); the pulse, seventy-four to ninety. At operation but little free pus was found, but a perisinus abscess was disclosed near the knee. In removing the bone from this area the sinus was wounded.

A blood count and a blood culture were taken on the following day. The count gave 2200 white, with eighty per cent polynuclear. The culture was negative. The following day, i. e., two days after the operation, the temperature rose to 102.2°, while the pulse remained at ninety-four to one hundred. This was a possible beginning of the brain abscess.

This condition gradually improved until the fifth day, when the temperature was about normal and the pulse about eighty. For another two days the temperature was subnormal and the pulse sixty-eight to eighty.

On the ninth day, in the early morning, the temperature rose to 104° and later to 104.8°; the pulse remaining ninety-two to one hundred. The blood count showed 6000 white, with seventy-nine per cent polynuclear. There was spontaneous nystagmus to the affected side—the second indication of brain abscess. There was cervical and occipital pain, but there was no stiffness of the neck. The Kernig was in question, and the Babinski toe reflex was lacking—or, rather, the toe remained stationary. It was not extended. There was no aphasia. The diagnosis, therefore, seemed a question between cerebellar abscess and sinus thrombosis. But the report on the following day on the blood culture showed a positive infection, and operation showed a clot in the sinus. The jugular was resected and the sinus was curetted until free bleeding occurred above and below the clotted portion. Three days later a blood culture showed no infection. The blood count was then 15,000 white, with seventy per cent polynuclear.

The temperature, however, remained 101° to 104°, with a pulse of from eight to ninety. The jugular wound and the sinus wound were exceedingly satisfactory. For five days after this there were no distinctive cerebral symptoms.

At the end of this interval, however, there was persistent occipital headache of intense character, and spontaneous nystagmus to the affected side. A general examination, made by Dr. Dench, disclosed nothing further. No reflex cerebral symptoms were found. (No vomiting, no Kernig, no Babinski, and no stiffness of the neck.) Cold water syringing of the affected ear diminished the nystagmus slightly and induced nystagmus of the opposite side. It was noticed that the packing towards the bulb was rather tightly placed, and this was made looser.

On the following day the patient was in every way better. The temperature was 99.5° to 100.5°; the pulse, eighty to one hundred. There was no headache, and the nystagmus was exceedingly faint. During the next two days, in the absence of cerebral symptoms, an elevation of one degree of temperature was explained by a small collection of pus at the lower end of the jugular wound. On the twelfth day after the jugular operation, and one week after nystagmus was noted, there occurred, rather suddenly, all the symptoms of cerebellar abscess: nystagmus to the same side; occipital pain, intense and persistent; Kernig, Babinski; and the cerebellar reflex symptoms; pointing on the affected side was deflected to the same side. Diadokokinesis was present. The eye grounds, however, were negative. Spinal puncture gave a clear fluid, not under pressure. Examinaiton of it showed Fehling and globulin tests, both plus, and the cell count to be ten. The cultivation was negative. Examination of the wound showed a good deal of pus in the sinus towards the bulb, absent the day before. This communicated with a cerebellar abscess of considerable extent. The abscess was opened and drained, but the patient died two days later.

DISCUSSION.

Dr. Phillips said that he wished to call attention to one symptom described by Dr. Hopkins, or to its absence—the absence of pain during the early stage of the disease. He also wished to emphasize another point that had appealed to him with great force in the last series of these cases that had come under his care—namely, that there may be a brain abscess of long standing and of considerable extent without producing any symptoms beyond headache. The fact that there is a brain abscess does not necessarily bring the symptoms one is supposed to find from reading the various textbooks.

Dr. Friesner asked Dr. Hopkins how the cerebellar abscess was drained—whether through the inner wall of the sinus or from in front of the sinus, whether a counter incision was made into the abscess; also, how widely the dura was opened and how widely the abscess was opened.

Dr. Hopkins replied that the sinus was drained by an incision on the inner side of the sinus where the abscess pointed, and it was quite thoroughly opened at that point. The condition remaining unimproved, the next day a counter opening was made behind the sinus; but the condition of the patient made it evident that there was no chance of recovery and that the second operation was not going to do any good.

Dr. Byrne asked what was the direction of the nystagmus, and also how the ear was irrigated, etc. In other words, what was done to eliminate labyrinthine disease as opposed to cerebellar abscess.

Dr. Hopkins replied that the nystagmus was toward the affected side. The syringing on that side produced nystagmus to the opposite side, and confirmatory tests were made.

The Isolation and Cultivation of the Tubercle Bacillus From the Discharging Ear in Cases of Chronic Purulent Otitis Media. (Preliminary Report.)

Dr. G. H. Cocks and Dr. J. G. Dwyer: Various methods have been employed in the past to diagnosticate aural tuberculosis, notably, von Pirquet's reaction, subcutaneous injections of tuberculin, animal inoculation, and the microscopic examination of tissue excised from the tympanum or mastoid.

Animal inoculation is attended with many difficulties and requires considerable time, during which the patient may disappear from observation. It is not always possible in chronic otitis to excise suitable tissue for microscopic examination. Subcutaneous injections of tuberculin and von Pirquet's test are open to the objection that the subject may be suffering from tuberculosis elsewhere in the body.

Our method for isolating and cultivating tubercle bacilli from the discharging ear appears to offer many advantages over the older methods hitherto employed.

Last year Dr. W. H. Haskin and one of us (Dwyer)* investigated the bacteriology of chronic purulent otitis media. The aural discharge was examined in all chronic purulent cases in which tuberculosis was suspected from the clinical signs or history. By the method pursued, the tubercle bacillus was demonstrated morphologically in six cases of otitis media and in one case of maxillary sinusitis. Reference is made in this report to some of these cases. The method used by us was a modification of the antiformin method of examination of sputum, the modification being necessary on account of the difference in character of the aural discharge and sputum. The method was as follows:

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*Haskin and Dwyer: New York Medical Journal. 1914.

The discharge was obtained in as large a bulk as possible in a small quantity of normal salt solution, the latter being used in amount just sufficient to wash out the pus. The water used in making up the salt solution was freshly distilled each day in order to be sure that none of the acid-fast organisms present in tap water or in old distilled water could vitiate our results. This discharge was then treated with an equal amount of fifteen per cent antiformin, and the whole was allowed to stand for a varying period, depending upon the consistency of the mixture, etc. It was then centrifugalized and the precipitate washed in order to remove the excess of alkali. Smears were then made from the precipitate and stained by Ziehl-Neilsen and Pappenheimer's method.

In this way we were able to demonstrate the organism with reasonable certainty. By this method, no matter how much care is exercised, there is always an element of uncertainty in morphologic diagnosis alone, as in many of the old chronic suppurating ears the acid-fast epithelioid flakes are apt to be mistaken for tubercle bacilli. These flakes are present in a large proportion of chronic cases.

In our own series, an effort was made to isolate the organisms from the discharge and cultivate them directly upon special media, so that there could be no question as to the diagnosis. Thus, animal inoculation was eliminated and much time was saved. This was made possible by Petroff's media, a full account of which appears in the *Journal of Experimental Medicine,* January, 1915. During the summer of 1914, Petroff, working in the Bacteriological Laboratory of the College of Physicians and Surgeons, Columbia University, devised a special medium which we have used successfully for cultivating the tubercle bacillus. Thus far we have tried this method on the discharge from thirty chronic suppurating ears, and have isolated tubercle bacilli in three cases. The three positive cases were found in making routine examinations of children who presented themselves at the Manhattan Eye, Ear and Throat Hospital suffering from chronic purulent otitis media.

The method we employ is somewhat different from Petroff's. It is really a combination of Petroff's method for isolating from sputum and his method for feces. This modification was rendered necessary by the large number of spore-forming organisms often present in chronic otitis. Our technic is as follows:

After obtaining the aural discharge in wide-mouth bottles it was immediately saturated with sodium chlorid and allowed to stand for one-half an hour to an hour. At the end of this time the bacteria were found floating on the surface. This floating film is then collected with a deflagration spoon in a wide-mouth bottle, and an equal amount of normal sodium hydroxid added. The mixture is shaken well and left for digestion in the incubator at 37° C. for one to two hours, or longer, care being taken to shake it every half hour. The mixture is then neutralized to sterile litmus paper with normal hydrochloric acid, and the sediment is inoculated into several test tubes. Growth usually occurs in from fifteen to thirty days.

At first no effort was made to differentiate the human and bovine types, but this is being done with the present specimens.

Nine cases of aural tuberculosis and one case of tuberculosis of the maxillary antrum were reported in the paper. Tubercle bacilli were isolated from the discharge in all ten cases.

DISCUSSION.

Dr. Haskin said that he had long been interested in the question of tuberculosis of the ear, and that several years before, he had presented one case before the Otological Society which he knew was tuberculous. He had tried in every possible way to find a means of staining it for tubercle bacillus, but failed, although he had found large masses of smegma bacilli. The first two cases in the Manhattan Eye, Ear, and Throat Hospital in which the tubercle bacillus was isolated were patients of his, and the discovery was made last winter when he and Dr. Dwyer were working together.

He was inclined to think that Dr. Cocks' estimate that one in every eight cases of chronic otorrhea in children was tubercular was a little too high. Thousands of cases are seen at the hospital, and recently this condition has been sought for, and whenever a suspicious case is seen it is examined, and the bacillus is often found, but hardly as often as one in eight cases, if every chronic suppuration were to be examined.

Dr. Phillips said that he had been greatly interested in this series of experiments and had taken pleasure in forwarding them in every way he could, so that Dr. Cocks had had the opportunity of studying the secretions from a large number of patients. He further said that merely from a clinical standpoint he had reached a different conclusion from that expressed by Dr. Haskin, and for a long time had felt that a large proportion of chronic suppurative ears in infants and young children were tuberculous in origin. It had also been his experience that tuberculosis of the ear may occur without any symptoms of general tuberculosis, and may remain a local disease. At the Postgraduate Hospital on Monday he had seen a patient from the Raybrook Sanitarium with suppuration of the ear that had come on painlessly. The condition had been going on for a month or two, and examination of the ear showed distinct miliary tubercles on the drum. It must be remembered that children frequently have tuberculosis in different parts of the body—in the glands, the long bones, or the joints—and recover without becoming victims of general tuberculosis. We often see adult middle ears, now dry, which have formerly been the seat of extensive purulent processes, with the drum, the ossicles, and perhaps the outer wall of the attic all gone, This condition strongly suggests a tuberculous origin. About three weeks ago he had operated on a child who came to the clinic with a facial paralysis of one or two weeks' standing and a chronic discharge but no pain. There was an enlarged mastoid antrum from extension of pus, and granulation tissue. Specimens of the pus, granlation tissue, and bone had been sent to the laboratory, and he thought that Dr. Dwyer would be able to isolate the tubercle in this case also, for it seemed to be a clear case of tuberculosis.

Dr. Wilson thought it would be interesting to know whether or not it was the bovine bacillus in these cases. It would look as though that might be a fact, inasmuch as so many of the patients were very young children.

Dr. Cocks, replying to Dr. Haskin, said that of these thirty cases, twenty-two were taken from a series at the Manhattan Hospital just as the children came in. It had been decided to test all the cases that came to the clinic with chronic suppuration of the middle ear. The ears were washed out, and the discharge was sent to the laboratory for culture. Of the twenty-two cases, three were tuberculous—and this was the basis of his statement that in the experiments conducted, one in every eight of the chronic running ears was tuberculous. That was not a high estimate. He had not come to the meeting prepared to quote statistics, but for many years back there have been articles in the British journals by Milligan, Jobson, and Horne, one of whom had stated that in his opinion from fifty to seventy per cent of the cases of chronic otitis media are tuberculous. Another one stated that in his opinion, instead of this condition being largely due to the acute exanthemata, tuberculosis ranks in the first place, and the other infections come second. It was consequently very desirable in studying this subject to get accurate statistics regarding it.

Dr. Dwyer, replying to Dr. Wilson's inquiry, said that they had intended later to look into the question of whether the bacillus was of the bovine or the human type.

Paper: Accidental Injuries to the Sigmoid Sinus Occurring During Simple Mastoidectomy.*

By William A. Scruton, M. D.,

New York.

DISCUSSION.

Dr. Harris said that he had followed Dr. Scruton's paper with a great deal of interest, and that the doctor was to be congratulated on the very careful manner in which he had worked out the report. No doubt, every one would agree with his conclusions, and some of them might perhaps be emphasized. Instances of the wounding of the sinus during operation are far more numerous than some think, and though in the majority of the cases the results are not serious, yet there are probably many more serious consequences than have ever been reported. Certainly, all unnecessary exposure of the sinus should be avoided. Unless there are distinct indications to the contrary, it is good surgery not to lay the sinus open. Another point is that the landmarks are such that it is sometimes impossible to avoid wounding the sinus in a simple mastoid operation. Dr. Haskin had some specimens which would show that very clearly. Everyone knows that it is impossible to avoid wounding the sinus unless some unusual route is taken, such as in the Stacke operation. The most important point is that we must no longer regard it a routine procedure. Dr. Scruton had driven home with great force the fact that we are called upon whenever we open the sinus to exercise the greatest care to prevent infection from taking place. Undoubtedly, in some of these cases infection will occur in spite of every effort, but in others, by taking extra precautions, we may be able to avoid any serious complications.

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*See page 310.

Dr. Page said that the paper was a very valuable one in that it called attention to the danger of an accident that was not generally regarded as very dangerous. Certainly, in the days when the antrum was entered directly with a chisel it was not an uncommon occurrence, and no record was kept of the consequences, but the operators seemed to regard it not as an error on their part, but as the will of God that the sinus was placed in the way of the chisel. As Dr. Harris said, it is a warning not to expose the sinus unnecessarily. There are times, however, when after the removal of the mastoid cells to get a cavity "like the inside of a tea cup," as Dr. Whiting expresses it, the inner plate is made so thin that its nutrition is likely to be impaired and quicker healing is gained from its removal over the normal sinus. Not infrequently a crack in it will necessitate its removal. Dr. Scruton's observations are sufficient warning to make him doubly careful from now on. He recalled a fatal case of sinus thrombosis which resulted from injury to the superior petrosal sinus during the removal of the cells from over it.

Dr. Kerrison said that Dr. Scruton's paper was of undoubted value in calling attention to the possible dangers of a fairly common surgical accident. Only one detail in Dr. Scruton's method of treating such an accident seemed open to question. Dr. Scruton in each case stopped the hemorrhage with a gauze pad or plug, and before applying the final dressing irrigated the wound with an antiseptic solution. Dr. Kerrison believed that when the sinus has been accidentally opened, it is safer to omit irrigations altogether. When the accident occurs, free bleeding should be allowed for a few moments, and then a plug of sterile iodoform gauze applied without great pressure to the site of the injury. This usually stops the bleeding promptly. If now we irrigate the wound, we do so only with the purpose of washing out infectious matter. But it is clear that at the same time infectious matter may be carried into or beneath the plug guarding the sinus injury, with possibly resulting intrasinus infection. It seems safer, therefore, in cases of accidental injuries, to simply cleanse the wound by wiping it out with sterile gauze or cotton.

Dr. Kerrison said that it was a distinctly courageous thing to bring before the section this series of cases. Those, however, who were personally acquainted with Dr. Scruton's work would know that the cases were treated with skill and care. The paper was, therefore, of decided value in calling attention to the fact that unintentional opening of the sinus is not without danger and is, therefore, an accident to be treated with respect.

Dr. Braun said that he was very glad to have heard Dr. Scruton's paper. He thought it a valuable contribution to otologic literature, in that it showed how far reaching and serious the consequences of accidental injury to the sinus may be. We have been inclined to look upon injury to the sinus only as an inconvenience in the completion of the operation, and have not thought much about the possibility of its leading to thrombosis.

He thought Dr. Scruton had been rather unfortunate in his experience. The large proportion of thrombosis following injury in his cases is not in keeping with the experience of most other otologists. He is convinced that this complication must be rather rare. He had never seen thrombosis follow injury to the sinus in any of his own cases, and only in one case operated upon by another man, in which the jugular bulb was injured.

The stage of the operation at which the injury occurs undoubtedly has some influence in determining whether thrombosis will result. If the injury occurs early in the operation, when the mastoid cells still contain large quantities of pus, there is certainly more likelihood of infection of the interior of the sinus than when the injury occurs toward the end of the operation, when the mastoid wound is comparatively clean.

Injury to the emissary vein is much more common than injury to the sinus itself, but thrombosis following such injury is very rare. In every mastoid operation, veins are torn across which empty into the sinus and offer an opportunity for infection of the contents of the sinus. But in injury to the sinus wall there is an additional factor which favors the formation of a thrombus, namely, the roughening of the sinus wall by the injury. This favors clotting, and the clot serves as a culture medium for the bacteria in the mastoid wound. But there is still another factor which is of some importance in producing the thrombus. When the sinus wall is injured at operation, the sinus is compressed by means of a plug, in order to control the bleeding. This causes a marked slowing of the blood current in the sinus at this point, or even a complete stoppage, which fact favors the formation of a clot within the sinus.

There is undoubtedly some clot formation in a large number of cases in which the sinus is injured, but symptoms are present in only those cases in which the clot becomes infected.

Dr. Friesner referred to the importance of the point made by Dr. Kerrison, and congratulated Dr. Scruton upon the interesting paper presented, but chiefly for his courage in reporting such serious and untoward results following technic error. Anyone who had watched Dr. Scruton operate would be confident that the mastoids had been thoroughly cleaned out.

One point which had impressed him especially while listening to the paper was that the results depend in a large measure upon where the sinus is injured. If it be injured somewhere through the mastoid cavity, before it bends forward to the bulb, it is comparatively easy to clean away the surrounding diseased bone. His own experience had been limited, and he could recall only one case in which he had injured the sinus in which any septic symptoms followed. In this case the injury occurred in the group of cells between the sinus behind and the bulb in front, underneath the facial nerve, and it was almost impossible to continue the operation and clean away the infected material in this narrow space. The patient had a single rise of temperature to 106°, followed by an equally rapid fall, with uneventful and complete recovery. It was impossible to explain these phenomena in any other way than by the presence of septic material in the vicinity of the injured sinus which in some way got into the circulation.

As far as statistics are concerned, no conclusion could be drawn from Dr. Scruton's report.

In a report before the Austrian Otological Society, Ruttin states that they operate on about six hundred mastoids a year. In these operations, the sinus is exposed from two hundred to three hundred times. They operate almost exclusively with the chisel and mallet, and we know that injury to the sinus is more frequent there than with us, though it would not seem that sinus thrombosis is appreciably more frequent with them than with us.

Dr. Scruton's experience was simply a piece of bad luck, and no one should conclude from it that injuries to the sinus are any more serious than has hitherto been believed.

Dr. Scruton, in closing the discussion, said that the purpose of the paper was to make an initial record of cases of sepsis resulting from accidental injury of the sigmoid sinus, and to direct attention to the advisability of instituting measures tending to prevent infection of the repair process in these cases.

While iodoform gauze is an excellent styptic, and has definite antiseptic value as the result of liberating iodin when in contact with the tissues, it is not good drainage material; especially when prepared by the soap solution suspension method practiced in hospitals. Having this in mind, dressings in case number four were changed daily.

He expressed appreciation of the kind attention given to his paper.

Fracture of Skull—Hemorrhage From Meningeal Artery Through Middle Ear—Operation—Recovery.

Dr. S. J. Kopetzky: On the morning of Sunday, March 20, 1914, the patient left his house at eleven o'clock. Within fifteen minutes he returned in a dazed condition, undressed, and went to bed, where he shortly became unconscious and so remained until the Thursday following. During this period of unconsciousness he had no symptoms of anything in particular, excepting that he vomited for the first few days, the vomit being tinged with blood. On Thursday, when he regained consciousness, he complained of pain in the right ear, and the attending physician called Dr. Kopetzky in consultation. When Dr. Kopetzky arrived, he found the patient in full possession of all his faculties, though slightly slow in cerebration. The ear drum had not been ruptured, but was somewhat bluish in color; and seen from the throat the eustachian tube gave evidence of having been bleeding. The tentative suggestion was made that the man had been hit on the head, or had fallen and sustained a fracture of the skull, and had bled through the eustachian tube, causing the blood stained vomit. The drum head was immediately incised to relieve the pain; no pus was obtained, but there was some bleeding, which continued from that time on for a few days.

The patient was removed to the Red Cross Hospital that afternoon for better observation, and that evening Dr. Strauss made a complete examination; lumbar puncture was then performed, and in the fluid old blood was found. From the neurologic aspect there was sufficient evidence to justify a diagnosis of fracture, with hemorrhage into the subdural spaces. The patient did well that night, and the following day (Friday) and Saturday, with no temperature elevation; but on Saturday evening he went into a state of coma from which he could not be aroused.

Meanwhile, an X-ray picture had been taken, which showed fracture parallel with the ridge toward the zygoma. Following the unconsciousness on Saturday evening, a decompression was performed at midnight. A flap was removed, as could be seen by the scars. Underneath the bone a tremendous amount of clot was found, which was carefully removed, and the dura was incised, the same way as the bone, but a quarter of an inch further inward, in order to give tissue to sew it up. One branch of the middle meningeal artery, by the posterior angle of the wound, was found to be still bleeding and spurting, one week after the injury. There was some difficulty in stopping the hemorrhage, but finally a piece of the temporal muscle was imbedded on the bleeding spot and sutured in place. The hemorrhage then stopped, the dura was sutured in place with fine stitches, and the patient made an uneventful recovery.

DISCUSSION.

Dr. Ard said that a case of fracture of the skull was recently transferred to his service in Muhlenberg Hospital, on account of the ear symptoms. At that time he knew no other treatment than the expectant plan, and asked Dr. Sharp to see the case. Dr. Sharp did not advise operation in this case, but in others seen subsequently, where there was marked evidence of increased intracranial pressure, he advised subtemporal decompression. Examination of the eyes is very important in these cases, as the most trustworthy symptom of intracranial pressure is swelling of the optic disc, particularly its nasal half. Incision is made through the fibers of the temporal muscle, a section of the bone is removed, a crucial incision is made in the dura, and drainage with rubber tissue from the lower angle of the wound is made; the muscle is carefully sutured and a hernia of the brain is thus prevented. The same operation on the opposite side is done, if improvement is not effected by the first operation.

Dr. Friesner asked Dr. Kopetzky if there were no external signs of fracture, no local edema or ecchymosis, and whether there was no paralysis on the opposite side, etc. Dr. Friesner said that he had recently seen a case where the patient fell in the subway and struck his chin, and returned home with practically the same history following as in Dr. Kopetzky's case. He had bilateral papilledema and Babinski, and no paralysis, although his coma continued for six hours. It was concluded that the middle meningeal or middle cerebral artery had not been injured, for if a clot had existed on the brain for five or six hours in the motor region, paresis or paralysis would have supervened.

Dr. Kopetzky, closing the discussion, said that the X-ray picture showed a linear fracture, whereas it had been supposed and was found to be a T-shaped one, an arm of the fracture running inward. The neurologic examination, made by Dr. Israel Strauss, had given ample data to justify the diagnosis.

Behind, when the flap was turned down, it looked exactly as flaps look when the two-stage operation is done—pasted down with clots of blood. The fact that the pressure was not continuous in the head, and that there was a vent for some of the blood, probably saved the man's life. He was not in coma except for a short time at the beginning. Most surgeons will tell you that after a shock the patient will have a preliminary coma, followed by a secondary longer one. This man was only in the secondary unconsciousness for a very short time.

Dr. Kopetzky said that he was not trying to explain anything, but only stating the facts in the case as they knew them and as shown by the X-ray and the operation.

Acute Mastoiditis—Sinus Thrombosis—Simple Ligation of Jugular.

Dr. Francis W. White: L. S., age seventeen years. On October 29, 1914, this patient was operated upon for removal of a nasopharyngeal tumor, and was presented before the laryngological section last month by Dr. Harmon Smith.

At the time of the operation the hemorrhage was so severe that postnasal plugging was required, the packing remaining in place for forty-eight hours. A few days later pain occurred in the right ear, followed by a discharge. The discharge contained the streptococcus mucosus. One day later mastoid symptoms appeared, and the patient was transferred to Dr. Duel's service. The next day a simple mastoidectomy was performed. Pus was found most abundant directly over the lateral sinus, which was lightly covered by markedly necrotic bone. A culture of this pus showed the presence of the streptococcus mucosus. The temperature for the next few days was very irregular, being between normal and 101 to 102 degrees. A blood culture at this time was negative after twenty-four hours. An autogenous vaccine was administered on two successive days. The blood culture was negative after forty-eight hours.

On the ninth day after the simple mastoidectomy, and three days after the negative forty-eight hour blood culture report, an acute middle ear suppuration of the left side occurred, also a superficial abscess on a toe of the right foot, and one on the ring finger of the left hand, about the base of the nail. These were probably autoinfections due to picking of the parts by the patient. For the next two days the temperature varied between 99 and 103 degrees, and on the next two it went to 105 to 106 degrees, respectively. An X-ray of the left mastoid was indefinite. A blood culture showed the presence of the streptococcus mucosus the next day.

The lateral right sinus was opened, and for a moment there was no flow of blood, then suddenly it gushed forth from below upward. This was quickly controlled and the attention directed to the internal jugular vein. Several glands were of necessity removed, as they completely covered and were intimately connected with the carotid sheath. The vein was ligated below the facial, which subsequently was ligated. Neither vein was severed. Three days later a blood culture was negative. A swelling occurred on the external malleolus of the left ankle, which increased in size and redness, finally becoming bleb-like. A culture from the fluid showed the streptococcus mucosus present. Vaccine was given.

The highest temperature after the ligation of the veins was 104°, on the fourth day. Within two weeks after ligation the temperature was normal.

The highest pulse rate during the whole course of the disease was one hundred and twenty-eight; the lowest, sixty, on the day after the ligation.

The urine was negative throughout the disease.

Highest leucocyte count, 22,000; lowest, 12,000. The highest erythrocyte count, 2,200,000; lowest hemoglobin, seventy per cent.

The patient was in the ward six weeks. Since leaving the hospital, the patient has gained twenty-seven pounds.

A Brief Consideration of Some of the Factors Concerned in Cases of Atypical Sinus Thrombosis.

Dr. Samuel J. Kopetzky recalled a case which he had presented before the Otological Section on October 9, 1908, where there was found on autopsy a sinus thrombosis presenting in a mastoid process in which there were no cells present, and he recalled the fact that ever since that time he has been on the outlook for similar cases.

On November 30, 1913, he operated upon a male adult, aged forty-seven years, who after an attack of otitis media developed a sinus thrombosis without the intervening symptoms of an acute mastoiditis. The operative findings showed a similar lack or absence of all mastoid cells in the process. The case recovered.

Dr. Kopetzky then presented a number of anatomic specimens which he had collected, in which, while the outside contour conformed with a normal mastoid process, the interior was entirely taken up by the lateral sinus and the cerebellum. He contended that the infectious process, after involving the tympanic cavity, manifestly could not spread through mastoid cells which were absent, and so immediately attacked the venous blood channels. This constituted one form of atypical sinus thrombosis which had not received recognition to date.

Dr. Kopetzky then went into a discussion of other forms of sinus thrombosis atypical in one or other manners, and cited cases where the blood culture was positive, the sinus wall on examination found normal, and yet a thrombus was found in its interior, and he reviewed the operative findings from such cases, presenting the contention that these occur most often in those types of mastoiditis where the intercellular bony walls of the mastoid process are not broken down, best typified by the hemorrhagic type of mastoid infection. The appearance of the sinus wall, therefore, is no test in such cases as to the presence or absence of a thrombus. Finally, he cited cases where a similar type of mastoid infection was present, the blood and clinical picture one of thrombosis, and yet no thrombus demonstrable in the sinus; and he contended, in view of the bacteremia and the complications which some of his cases presented, such as secondary infection in the joints and muscles, that a thrombosis was present in the small veins in the walls between the mastoid cells; and he showed pathologic specimens of such thrombi. This group was another form to be classed as atypical thromboses.

The usual type of thrombosis with the discolored sinus wall and granulations on the sinus was found to occur mostly in the socalled coalescent type of mastoid infection.

The following charts summarize the paper:

CHART I.

Lesions Which Give Both the Clinical and the Blood Picture of Sinus Thrombosis.

Lesions.	Location.	Induced by.	Class of Case.
Phlebitis. Thrombophlebitis.	Lateral or sigmoid sinus. Dome of jugular.	Mastoid and tympanic infections.	Typical cases.
Thrombophlebitis.	Jugular bulb.	Tympanic and internal ear infections.	Atypical cases.
Osteothrombophlebitis or osteophlebitis.	Small veins in bony intercellular walls of mastoid.	Mastoid infections.	Atypical cases.
Osteophlebitis. Sinus thrombosis. Osteothrombophlebitis	Lateral sinus. Veins from labyrinth. Jugular bulb.	Tympanic or internal ear infections.	Atypical cases.

CHART II.

Typical Sinus Lesions.

Type of Tympanic and Mastoid Lesion.	Blood Vessel Reached Through Intermediary of.	Appearance of Sinus Wall.	Secondary Lesion.
Coalescent type.	Contact and erosion granulations.	1. Granulations. 2. Discolored. 3. Wall open into mastoidal abscess.	Heart, lungs or none.
Hemorrhagic type.	Through thrombi of small veins in bony walls of mastoid cells.	Wall is usually normal in appearance.	Joints, muscles.
Chronic mastoiditis. 1. Bone lesion. 2. Cholesteatomata. 3. Acute exacerbations of O. M. P. C.	Contact of purulent tracts.	Rarely normal.	Heart, lungs. Intracranial lesions from thrombi and from original bone disease.

CHART III.

Atypical Sinus Lesions.

Type of Tympanic Infections.	Blood Vessel Reached Through Intermediary of.	Appearance of Sinus Wall.	Secondary Complications.
Acute middle ear infections.	Contact through floor of tympanum or small veins.	Normal.	Heart and lungs. Occasionally joints.
Acute middle ear infections.	Because of bone anomalies by contact or through network of veins.	Normal.	Joints and muscles.

DISCUSSION.

Dr. Berens congratulated Dr. Kopetzky on the complete and thorough manner in which he had presented the subject. The last word has not yet been heard on septicemia from ear disease, but we are learning, and learning rapidly, what Dr. Kopetzky endeavored to accentuate—that an osteophlebitis may occur in the mastoid and surrounding bone without any demonstrable clot or phlebitis in the lateral sinus. If Dr. Kopetzky had done nothing but accentuate that point and bring it home to the profession, he had accomplished a good work and his time would have been well spent.

All who had seen much of this work had seen such cases as Dr. Kopetzky had described—cases of septicemia with high up-and-down temperature. The sinus is uncovered, and the walls found to be healthy; it is opened, and no clot found. A complete exenteration of the mastoid and its cells is done, and the small thrombi are removed from the veins in the bone. These veins necessarily eventually enter into the general circulation, and we can get symptoms without really having a lateral sinus thrombosis.

Dr. Berens said that he had seen two cases where he went down into the innominate.

Dr. Berens said that he felt he must take exception to Dr. White's surgery. He had done a beautiful operation and the patient had made a beautiful recovery, and it might appear to be bad form to criticize the method employed, but where there is a clot present, the vein should be opened between the ligature and the clot, and drained at least, if it is not removed. In phlebitis where the vein is white or its walls striated, the vein should be exsected as far as it is diseased.

Dr. Duel thought that the classification of cases of septic thrombosis which Dr. Kopetzky has presented was a very useful one. As Dr. Berens had said, it brought out very clearly what all have been gradually coming to realize—i. e., that in septicemia from mastoid and middle ear suppurations, the so-called atypical cases are as frequent as the socalled typical ones, if not more so. The time may come when we shall classify as typical cases certain cases of septicemia from aural suppuration which are now called atypical sinus thrombosis.

Dr. Duel agreed with Dr. Berens, that in many of the cases in which septicemia is present there is no demonstrable clot in the lateral sinus. For a long time he had found, nevertheless, that the surgery done for the relief of the situation—i. e., the isolation of the area which was taking in the sepsis—had cured the patient. His success in treating otitic septicemia had been much greater since he had gotten away from the notion that a clot must be exhibited in the lateral sinus or jugular bulb in order to demonstrate the necessity for operation. The question of whether or not in the presence of a clot in the lateral sinus the surgery suggested by Dr. Berens is the best, is one which presents opportunity for much discussion. Personally, of late years he had found very few cases where he thought it necessary to resect the jugular vein, although he had formerly always adopted that method. At present, as a rule, he simply ties and severs it from above the facial vein unless, after exposure, he finds that the clot has extended beyond that level.

Within the cranium he plugs the sinus toward the torcular, well beyond the clot. The sinus is split and laid open from this plug to the bulb. If the thrombus is easily removable without great hemorrhage, it is done at once, but in most cases, to avoid the dangerous hemorrhage, he is usually satisfied to remove the offending clot at the first or second dressing following the operation, if he has been successful in stopping the clinical evidence of general sepsis for which the operation was performed. The presence of the thrombus is locally not a great menace. To spend much time trying to remove it after the circulation is cut off at the torcular and jugular ends is unwise, unless the petrosals are plugged, as the loss of blood is appalling at the time, and much more dangerous for the patient than the now localized septic clot. One to three days later, the clot can be removed without hemorrhage—the petrosals having been plugged off by a healthy clot as soon as they were unable to deliver blood into the sigmoid and bulb.

Dr. Berens explained that he had not intended to be understood to say that he exsects the jugular from the clavicle up. If that impression had been given, he wished to correct it.

Dr. Kerrison said that apparently a useful deduction might be drawn from this paper in determining the surgical indications in certain cases. Dr. Kopetzky's report seemed to show so many avenues of infection from a diseased mastoid to the jugular system of veins, that in cases of suspected sinus infection it would seem safer to ligate or resect the jugular, even though no physical evidences of a clot or septic lesion could be demonstrated in the sigmoid sinus or bulb.

Dr. Chambers told of an atypical case in which the septicemia had continued for a month after the radical operation had been done, and it had seemed as if it must be a case of sinus thrombosis, although there were no symptoms excepting those of septicemia. Dr. Kopetzky had seen the case, and advised opening the vein. The patient had the septicemic temperature curve for certainly a month afterward; then he had a perirenal abscess, which was opened two or three months ago, and recently he had returned with a second abscess in that region; an inquiry about the condition of the ear elicited the response that that was all right.

Dr. Held said that Dr. Kopetzky's paper had brought out a number of excellent points, and had also reminded those who keep records of our operative findings that we all have had experience with a number of these cases of atypical sinus thrombosis. After speaking with Dr. Kopetzky on this subject a few weeks previously, he had looked up his records and had found more of them than he had thought. One particularly interesting case was typical in every way, and yet the operative findings had showed nothing—but the plugging off of the sinus resulted in immediate cure. We should all remember that when there are clinical symptoms of septicemia with suspected sinus thrombosis, we should follow the same treatment that we would if we knew there was a clot—uncover, ligate, and remove clot if found.

Dr. Imperatori said that Dr. Kopetzky had omitted, in his classification of atypical sinus thrombosis, to mention one type of case, that is, those instances in which the middle ear was not infected, occurring in scarlet fever with cervical adenitis. The internal jugular vein becomes thrombosed, and there is an extension of the process to the bulb and sinus. Several such cases had been reported before the section.

Dr. Heller said that these cases very often tax the judgment as to just what should be done, and where to stop. A month ago Dr. Carter had reported a case of a child with septic symptoms, who recovered after a simple mastoid operation. If we are to stand on the footing as reported this evening, are we always—when we have an apparent or true septicemia and find that the vein looks normal—to tie off the jugular vein? When are we going to choose? Dr. Carter had shown that a simple mastoid operation in a case of undoubted septicemia, cured the patient. The question is, What one sign or group of signs can we take as a standard as to when we should go in and open, and when to tie off the vein? We do not want to subject the patient to a needless operation if it can be avoided, and we do not want to open them all.

Dr. White said that he had nothing to add to the discussion excepting to say that he was following the teaching of the Viennese school—where ligation of the internal jugular was practiced, but not its removal—the results of which up to the present time have been exceedingly satisfactory. As a matter of fact, he had not seen the removal of the internal jugular vein for lateral sinus thrombosis until he became a member of the visiting staff of the Manhattan Eye, Ear and Throat Hospital.

Dr. Carter said that Dr. Kopetzky had brought up a most important subject just at this time, and it should be remembered that venous stasis, venous thrombosis, and exudation of blood corpuscles through the walls of the vessels form part of the inflammatory process—is really the latter part of the third stage of inflammation; and while that is normally inflammation, it should be borne in mind that it has this important bearing upon sinus thrombosis. The case which Dr. Carter had presented at the last meeting of the section and which had been mentioned by Dr. Kopetzky and others in the discussion, illustrated admirably the principles emphasized in the paper of the evening.

Dr. White asked if Dr. Kopetzky had had any experience with the vaccines, of which so much is heard nowadays, and said that he had many offers from various vaccine enthusiasts to cure cases of mastoiditis that came under his care.

Dr. Guttman said that he had been much interested in the paper, but that there seemed to be some misunderstanding in regard to the clinical picture which Koerner describes as osteophlebitis. Koerner considers osteophlebitis not necessarily in connection with sinus thrombosis, but a disease by itself, with well defined clinical symptoms. Osteophlebitis is caused by an infectious thrombosis of the small veins in the mastoid bone in cases of acute middle ear suppuration with or without mastoiditis. As a rule, these cases get well without surgical interference.

We occasionally see some cases of atypical sinus thrombosis. Only a few weeks ago he had such a case under observation. A child, about four years old, was suffering from acute purulent otitis media of the left ear, when one day he began to complain of the right ear. Dr. Guttman was called in and made a paracentesis on the right drum membrane, after which the child felt quite well for a few days, and then suddenly became very seriously sick, with chills, vomiting, semi-consciousness, and a temperature of 106°. The temperature varied between 104° and 106°. Locally, there was noticeable only a slight edema over the left mastoid bone. Dr. Guttman was prepared to open the antrum and lay bare the sinus, when, thirty-six hours after the onset of the disease, the temperature went down and ultimately became normal. The next day the pulse of the child became very irregular, which suggested the thought of a septic endocarditis. This symptom also subsided after twenty-four hours, and the child left the hospital perfectly well, after a stay of four days.

Had this child been operated upon, the sinus opened and no thrombus found, it would have been considered one of the atypical cases of sinus thrombosis. It is true, one cannot always rely upon such a fortunate outcome. Every case must be judged individually, and there will always be found cases which cannot be classified in any of the groups presented tonight.

Dr. Joseph Byrne said he had not been able to orient himself clearly on the case, as stated. He understood Dr. Kopetzky to say there was a linear fracture of the bone discovered parallel to the zygomatic arch at such a height that it could not possibly have involved the petrous bone, and as there was no mention of a fracture of the base, or complete rupture of the dura over the convexity, he did not see how blood could have reached the tympanic cavity. The cerebral dura mater consists of two layers over the convexity. The outer layer, rich in blood vessels and nerves, acts as periosteum for the inner surface of the cranial bones, whilst the less vascular inner layer, consisting of more or less cellular fibroelastic tissue lined on the cerebral surface by a single layer of flat cells, constitutes the investing membrane proper of the brain. Between these two layers of the dura are found large venous sinuses. In fractures of the vault the outer layer of the dura is frequently injured without rupture of the inner cerebral layer. This gives us the epidural variety of hemorrhage, with its well known sequence of clinical phenomena, e. g., history of cranial injury, immediate temporary unconsciousness due to concussion, followed by a period of lucidity, which in turn, as the arterial hemorrhage progresses, gives place to the persistent progressive coma of progressively increasing intracranial pressure. Over the base the dura forms a single compact membrane closely adherent to the bone. In this region it is practically impossible to have fracture of the bone without rupture of the dura. Hence fractures of the base are usually of the compound variety, and the hemorrhage resulting therefrom is always of the subdural variety.

Now, as lumbar puncture had shown blood in the cerebrospinal fluid, the conclusion is inevitable that there existed subdural hemorrhage, and as there was no mention of the inner layer of dura having been found torn at the operation done for epidural hemorrhage, it seemed we were here dealing with a fracture of the base through the petrous bone. In no other way could blood reach the tympanic cavity. But perhaps the neurologic examination (which was not read by Dr. Kopetzky) may throw some light on the matter.

Dr. Kopetzky thanked the gentlemen who had taken part in the discussion, and apologized to Dr. Imperatori in that he had limited his presentation to cases of sinus thrombosis of otitic origin.

Replying to Dr. White, he said that he has only a limited experience with vaccine treatment. The more serious cases he had reported, and some of which recovered, had not been given vaccines. The second case to which he had referred had received Hiss extract, and had recovered, but he was not inclined to ascribe the cure to the use of the extract. He could not give a more definite statement on the vaccine question. To his mind, their value remained as yet unproven.

It was very difficult to analyze the case spoken of by Dr. Guttman. Some cases properly treated, die, while others improperly treated, get well. Dr. Kopetzky said he would have ligated in this case rather than take the chances which Dr. Guttman had taken.

Paper: A Simple Manometric Apparatus for Measuring Eustachian Tubal Patency and Tympanic Ossicular Mobility.*

By L. M. Hubby, M. D.,

New York.

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*See page 307.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

Regular Meeting, November 17, 1914.

DR. OTTO J. STEIN, THE PRESIDENT, IN THE CHAIR.

Case of Brain Abscess.

DR. OTTO J. STEIN showed the specimen from a case of brain abscess. The patient was a young man of twenty-six, who gave a history of having had chronic suppurative trouble with the middle ear for nineteen years, with occasional acute exacerbations, without any unusual symptoms. His last attack occurred in July. He was seen three weeks after the onset of this acute attack, and presented the following history and appearance: Family and personal histories negative. Married; one healthy child. Habits good. When he entered the hospital he showed nothing particular, except that he was suffering very severely from a headache of the type suggestive of some intracranial complication. There had been considerable discharge from the right ear, which had practically stopped the day before entrance to the hospital. The severe pain developed a day or two before coming to the hospital, and continued to grow worse. He became nauseated, and vomited all the night before and morning of entering the hospital. The mentality was perfectly normal. Temperature about 100.5°. That evening it dropped to normal, and remained within a range of a degree and a half. The pulse was rather striking—fifty-six to sixty-four—not very full, but rather weak, and not very regular. The smear from the ear showed a mixed infection of pneumococci and staphylococci, with a few short chains of streptococci. X-ray pictures taken the next morning showed nothing, so far as the ear was concerned, from the speaker's standpoint, but others who saw them thought they gave positive findings. The blood count showed 19,000 whites, with an eighty-five per cent polynuclear count. Urine normal. There were no particular eye symptoms; no nystagmus; no irregularity of the pupils; they reacted a little slowly to both light and accommodation, and were equal.

The points he wished to emphasize were: Temperature about normal, subnormal pulse, severe head pain and vomiting.

He diagnosed a mastoid, with a probable brain complication. Operation showed the sinus lying very far forward, presenting immediately with the first chip of the chisel. The middle cerebral fossa also lay very superficially. This made it very difficult to find the antrum, but the entire bone was involved, as in an acute mastoid. The only pus found was in the posterior cells of the zygoma, just around the floor of the middle fossa, and there five or six drops were found, in which the organisms above mentioned were found. The dura was dark red, thick, fleshy-like, about the area of the middle finger nail. It was not adherent, and no extradural abscess was found. Then the sinus was uncovered and showed no trouble. The antrum was found with difficulty; it was full of granulations and pus, the smears showing the same organisms. The speaker then decided to do a radical operation. He took out the bony posterior wall, and left the wound open, without opening the dura.

The next morning the man was practically free from pain, the other symptoms having also subsided. The temperature was normal. That afternoon at about four o'clock the same condition prevailed, but in the evening he was called up on account of the return of the severe pain; temperature went up that night to 102.4°; nauseated; there was a great deal of gas in the stomach and intestines. Breath very foul. Tongue badly coated. The pulse kept getting slower again, from seventy to fifty-four. Mentality not clouded.

Unfortunately, Dr. Stein had arranged to go away about this time, but hesitated about leaving this patient, without opening the brain, so decided to operate again. He enlarged the opening formerly made around the posterior root of the zygoma—just at the bend—and found healthy dura. Then he passed the knife through the dura and into the brain in the temporosphenoidal area, back as far as anyone would want to, and could find no pus. He then pushed the knife upward, and found nothing; then anteriorly, and found no pus. He was rather chagrined, and put a small drain in—a gutta percha cigarette drain. The next morning the man was perfectly free form pain and felt comfortable; mentality clear; temperature had dropped to 100°, but the slow pulse still persisted.

Dr. Stein left the city the next day, leaving this patient in the care of Dr. Fletcher and Dr. Jones. During that week the patient's condition fluctuated. A lumbar puncture had been done at the operation, and a very decided pressure found; the same organisms were found in the fluid as in the former smears made. There was also a little blood present in the fluid. A second lumbar puncture was made during Dr. Stein's absence—four or five days after the operation—on account of severe symptoms. The puncture relieved him. Fifteen cubic centimeters of fluid were removed. From that time he seemed to progress very well; however, he always had a little headache and a little temperature. During the following week it never rose above 100.5°. The pulse improved, as well, as the general condition. He was apparently on the way to recovery. When Dr. Stein returned he was quite confident of the man's recovery; only now and then he would complain of lancinating, sharp pain in the head. Three or four days later he suddenly got much worse; the pain in the head became very severe; the nausea returned, and symptoms of a severe nature developed, so it was thought another puncture might be a good thing. No indications seemed to be present for opening the sinus. On puncture there was no pressure; but the fluid was a little cloudy. There were no organisms, but some pus cells. This puncture gave him no relief whatever. He continued to get worse until all the classic symptoms of the terminal stage of abscess developed, and he died—about two weeks after he was first seen.

On postmortem an enormous abscess was found in the right temporosphenoidal lobe, with hardly any capsule. The same organisms were found.

The question in Dr. Stein's mind is: While it is easy enough to make a diagnosis of brain abscess with these symptoms, and sometimes even to localize the same, and even to get the consent of the family to operate, still the question is to know exactly when to open into a brain. His idea is that this patient, at the time of operation, was developing a brain abscess; the brain was in a state of red softening. He does not think he infected the brain. He believes he operated too soon. If he had operated later—say, on his return to the city, and at the time the last lumbar puncture was made—he probably could have opened the abscess and drained it, with recovery of the patient. However, he feels that instead of tapping the spine for the third time he should have sought the abscess, and it no doubt would have been found then. That, he thinks, is the most important thing about the case, and he wished to hear the experience of the other members in regard to the time of opening a brain abscess.

DISCUSSION.

DR. HARRY KAHN asked what was the location of the abscess.

DR. STEIN said it was in the temporosphenoidal lobe.

DR. J. R. FLETCHER recognized the case. In answer to Dr. Stein's query as to when to operate in these cases, he would say that he would be very much inclined to open these abscesses as soon as he could make a diagnosis. In the case reported, the speaker was called to the hospital during Dr. Stein's absence from the city, because the man had developed a state of delirium. The blood pressure had increased very much. For this reason another lumbar puncture had been performed, after which he improved so much that it was thought he would recover. Right after that the urine was examined, and the organisms referred to by Dr. Stein were found present in large quantities. The termination in this case was a great surprise to Dr. Fletcher, because the man was apparently recovering so nicely, and even volunteered the information to those around him that he was going to get well promptly. But as to the time of operation, he would operate when he thought he could make the diagnosis of brain abscess. His own idea is that the abscess was present, but small, when Dr. Stein operated, and therefore the knife blade did not reach it.

DR. GOOD asked in what way the increased pressure was determined.

DR. STEIN replied that it was determined by the appearance as the fluid came out.

DR. FLETCHER said that they took the blood pressure while Dr. Stein was away.

DR. JOSEPH C. BECK was very much astonished that Dr.

Stein neglected to follow the modern method of treatment of brain abscess, which is to open the dura and wall off the area, and let the abscess, if it will, progress to the surface; then open in the second stage, about a week or ten days after. That is the preferred method of treating brain abscess at this time, as shown in a series of cases operated by McKernon, Dench, and others, that that method gives the best prognosis. While his (Beck's) results up to this time have been very poor in the treatment of brain abscess, with this method he has had the best results. Therefore, he would say, contrary to Dr. Fletcher's statement, that in this case the dura should have been opened if the diagnosis was made of abscess the second time patient was operated upon; the tendency would have been for the abscess to form a walling off, and then incision and drainage would have probably given a better result, in that the healthy brain tissue was not infected.

Dr. J. R. Fletcher said he was not willing to accept any man's method as a modern method. All methods are modern methods. Simply because one man makes a statement that this, that or the other is better, he is not prepared to call that a modern method, or be surprised that one does not follow it. He would operate on a brain abscess, even now, just as soon as he made the diagnosis.

Dr. Beck said he would operate immediately, but in two stages.

Dr. Fletcher said he would open the abscess if he could find it.

Dr. Beck said that Dr. Stein should have waited until the abscess had had a chance to come to the surface.

Dr. Stein asked Dr. Beck if he meant that he should have let an exudate form there, to which Dr. Beck replied in the affirmative.

Dr. Stein said that he had presented the specimen and described the case in order to get the opinions of the members. He was glad to hear that Dr. Fletcher has a definite idea as to what he would do with a case of brain abscess. He would admit that he had never walled one off. He has opened them, in cases where he has found the abscess, and has not had bad results. Others probably have had the same experience as he. Of course, he has had fatal results in cases where he has found the abscess, also, even if well walled off. It was interesting to know the attitude of the profession, and it was probably also of value.

Paper: Ethmoidal Exenteration.*

By Charles M. Robertson, M. D.,

Chicago.

DISCUSSION.

Dr. O. T. Freer said that the entrance into the ethmoidal labyrinth through the bulla, suggested by Dr. Robertson, a way also advised by Boenninghaus and Vacher, is a good one, and often better than the route through the agger cell of Mosher, for this cell is sometimes absent or unduly thick-walled, while the bulla is frail and easy to see when the middle turbinate has been resected.

The chief characteristic of chronic ethmoiditis is the formation of polypi. When superficial, they do not affect the skeleton of the ethmoid region. In the common deep type of ethmoiditis, however, where the polypi form within the cells, they destroy the cell walls by pressure absorption, and the entire lateral mass of ethmoid cells usually degenerates into a polypoid mass, with occasional thin plates of bone remaining as vestiges of the cell walls. The degeneration virtually dissects out the entire ethmoid mass of cells, including the frontal cells of Killian, which form the floor of the frontal sinus, so that a probe or curette enters the widely open sinus in the course of the operation. In such cases the bulla, the agger cell, the processus uncinatus, the middle turbinated body, all of the landmarks, are gone, and the operator has to trust to the mental picture of the ethmoid region anatomic study has given him, and to his fine sense of touch, which tells him when his curette has gone beyond the region of degeneration and has reached healthy, hard bone. This bone, in the outward direction, may be the firm walls of sound ethmoid cells, or else the degeneration may have reached the lamina papyracea of the orbit. Considering the frailty of this plate, the greatest caution is necessary in approaching it, and Dr. Freer had been told of two cases where it had been penetrated.

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*See page 319.

Very gentle management of the curette and punch is needed to insure safety.

Upward, the curette may have to travel to the tegmen or cranial roof of the lateral mass of ethmoid cells. The cribriform plate is not in danger if the curette be kept outside of the line of the vertical plate that bounds the ethmoid cells inwardly and ends in the middle turbinate below, as shown by P. Watson Williams (*Journal of Laryngology*, May, 1914).

Where no polypoid degeneration of the ethmoidal labyrinth exists, Mosher's landmarks and the bulla are easily found.

Resection of the perpendicular plate of the ethmoid bone in the nasal septum to the cribriform plate, as suggested by Dr. Robertson, Dr. Freer thought dangerous. The perpendicular plate often has to be cut away to within one-half inch of the cribriform plate, but to remove it up to the latter would involve a chance of meningitis, because of the intimate lymphatic connection between the nasal lining and the dura in this region.

Dr. H. W. Loeb, of St. Louis, speaking with reference to the cells mentioned by Dr. Robertson as being found in the middle turbinate, was not willing to accept them as always being due to inflammatory processes. The interesting thing about them is that the opening is almost always near the roof of the cells, rather than near the floor, as in the other ethmoid cells.

He reported an operation for extensive disease of the ethmoid, in which he unfortunately entered the periorbita. He took out several pieces of what he thought were strange-looking polypi, and found that they floated, which showed him that it was periorbital fat he was removing. In this case, if there was any hard bone on the orbital side of the ethmoid cells, he did not strike it. Either the disease had destroyed it, or there was a dehiscence. The patient had a very violent reaction, but recovered.

Dr. R. H. Good said, in regard to saving the middle turbinate body, that he tried faithfully to carry out this principle some years ago. However, he has found that many of the cases are polypoid degenerations; there are many in which the upper nasal space is very narrow, and many in which the middle turbinate, on account of enlargement or degeneration, needs to be removed. If it is not removed, at least the anterior portion, in some of these cases it causes considerable disturbance afterwards. Especially has he noticed this in the intranasal frontal sinus operations, where he would leave the middle turbinate in place. There would be considerable congestion in the nose, and the patient would not get along nearly so well as if the anterior turbinated body and ethmoidal cells had been removed.

In regard to cleaning out the ethmoid cells, he has done quite a number of these operations. He goes through the bulla and bites an opening upwards and backwards to the base of the skull with forceps. Then he takes the frontal sinus rasp, with the smooth surface toward the orbit, beginning in the posterior ethmoid cells, coming forward and rasping out the ethmoid cells up into the frontal sinus. He considers this method very simple and thorough.

Dr. Robertson, in closing, referred to Dr. Freer's remark that the bulla is sometimes destroyed, so that we are unable to find it. Dr. Freer can easily find the bulla, and so could the speaker, and so could all of the members, by the anatomic relations in the nose—even with eyes shut. Dr. Freer knows exactly where it is, at what distance, and at just what angle. So the speaker felt sure Dr. Freer would retract that statement.

Dr. Freer said that he had previously stated that the bulla is frequently so diseased that it is lost. Of course, if it is present he could find it.

Dr. Robertson, again referring to Dr. Freer's remarks, said that Dr. Freer had said "that to preserve the turbinate would be to preserve pathologic tissue." The speaker had said that these were cases in which the case had been operated first, and that pathologic tissue had already been removed. There are cases of this type in which all of the tissues of the nose have degenerated, and sometimes we find noses in which there is a myxomatous degeneration of the entire contents of the nares. In such a case he would not pretend to do the type of operation described.

The rule of going into the nostril until you find a hard lamina of bone is a dangerous one to pursue unless you go anatomically, because the lamina papyracea is often dehiscent, as Dr. Loeb said, and one is liable to get globules of orbital fat. He has seen cases in which the lamina papyracea was so thick that a steel curette would not go through it. Individual peculiarity comes into account in these cases.

He would not attempt to remove the septum as far as the cribriform plate. He would expect to remove it as far as possible toward the cribriform plate, however. There is a danger of meningitis, just as there is a danger of meningitis in any operation on the nose. Of course, the nearer you get toward the cribriform plate, the more you subject your patient to risk.

Dr. Loeb said that "these cells were not always due to an inflammatory process." Dr. Robertson did not say that they were, but he thinks that there are some of them that are. In examining skulls, one very often finds large cavities in the turbinates, both in the middle and inferior. Where there is much disease, the middle turbinate is still pathologic. It is pathologic, but you save it with the idea that it will at least do some of its function after the disease has settled down. If it does not, you can easily take it out afterward, because it is a painless operation, and only takes a short time. After the cells have been removed and the turbinate fractured, there is still some space where the cells were, so that if there is a continuation of pus formation, it can easily be mopped out.

Dr. Good said "he had tried to save the middle turbinate, but that it was inflamed." Surely he would not expect to take out an inflamed turbinate at any time. If treated properly, the inflammation will subside. This can be done to a considerable extent by medication in the nose. Unless in a pathologic condition, you would not expect to take it out at all.

"The space is too narrow in some of these cases." That is just the object of the operation described, namely, to get more space and still save the turbinate. You can get at least one-eighth inch in the transverse diameter in the nose by this method, and that is plenty for ventilation.

"In many of these cases there are polypi." These are polypoid and do not constitute a diseased condition in a case of that kind; they simply are a symptom of pus, and after the pus is relieved the polypoid tissue will disappear. If the polypoid tissue persists, you may be sure that you have not reached the ultimate end of the ethmoid cells that produces the secretion which results in the polypoid tissue.

Paper: The Use of Pituitary Extract as a Coagulant in Surgery of the Nose and Throat.*

By Harry Kahn, M. D., and L. E. Gordon, M. D.,

Chicago.

DISCUSSION.

Dr. L. E. Gordon said the principal point that they wished to bring forth was that the extract of the posterior portion of the hypophysis, when injected, influences the coagulation of blood by decreasing its coagulation time. The coagulation time is decreased within fifteen minutes, and it remains so for over twenty-four hours. What causes this coagulation? Francini, in 1910, while working on metabolism with pituitrin, found a lessened amount of calcium in the body tissues, and a greater amount of calcium thrown out into the blood stream. This point may be worth further consideration.

The injection of pituitrin has been found to practically stop bleeding in almost every case. A great deal more work can be done with pituitrin to prolong the effect of epinephrin. There is no need to fear capillary bleeding three or four hours after its use. With the use of pituitrin it is possible to do more work in the office, without being afraid to send the patient home. The speaker, together with Dr. Kahn, recommended the use of this drug to the members as a preoperative procedure.

Dr. A. M. Corwin thought this a very interesting subject. In the modern use of some of the extracts of the ductless glands we have entered on a new era in therapeusis and physiology, and pituitrin seems to be coming into its own, as well as thyroid extract and others. This is partially due to its selective and safe action upon the unstriped muscles in the intestine, stimulating their contraction and their tone, and, owing to its affinity for the uterus, it bids fair to take the place of ergot. These things are all interesting to us. He remembered having read Citelli's article in the *Zeitschrift* last year, and while a few men have been working out the intimate problems of the physiology of this drug, there are comparatively few findings such as those presented by the essayists. They should be commended very highly, not only by internal recognition, but by external voice. This kind of careful analysis of a series of cases is done in too few instances, but it is the only way to arrive at sure results.

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*See page 322.

Dr. Corwin has used pituitrin in a number of cases. He has not had very many severe hemorrhages, but in those cases that he has been called in consultation to see since reading Citelli's first article, he has used this drug, and in several instances with very fascinating results.

With regard to the question of the invariable heightening of blood pressure, he was very much impressed with the case of a woman, fifty-five years of age, with well marked symptoms and findings of Bright's disease, in which there had been uncontrollable hemorrhage from the nose, an epistaxis that had defied packing and all sorts of things. This patient's blood was just like water, even thirty minutes or an hour after being drawn off. There was apparently no coagulation at all —or only a very faint sign of it. Blood pressure was two hundred. After very depleting hemorrhages her blood pressure had fallen, before the speaker saw her, to one hundred and sixty, and this had been maintained for a number of hours —perhaps six—in which the tests had been made. He injected pituitrin and the blood pressure came down within the next few hours, without any further hemorrhage to account for it, to one hundred and forty, and there it remained. In that case the urinary findings were those of a contracted kidney. Her pulse, however, became firm and strong, increased in force, and increased in strength, so that the cardiac stimulant was very apparent, and the question was whether this effect was due to the contraction of the vessels, which we are told occurs, except in those of the kidney, where dilatation takes place, causing diuresis.

Is the local effect due as in epinephrin, or also due to the selective affinity in the direction of blood coagulation, as in the various sera and antitoxins we inject, which we know produce the same sort of thing? This one case seemed to show him very clearly that pituitrin had this increased coagulating power, because within half an hour after the primary injection the effect was marked; the injections were repeated every six and then every twelve hours until the patient was entirely recovered.

Organic extract therapy is a revolutionary proposition. It is simply marvelous, and he was very much pleased with the work of the essayists. However, the cases in this series were all children; another series must be studied in adults. It will probably be a number of years before we fully understand the true effects of this and the other extracts of tissues.

Just a word regarding the point of frequency of injections. In our work with the drug we give injections every six or twelve hours. It is arbitrary. Dr. Gordon's observation would seem to give us at least the opening door to this question, and twenty-four hours, perhaps, would seem to be often enough to make the injections.

Dr. J. Holinger said that if the discussion was limited to pituitrin, he had nothing to say; but if the members would permit him to say a few words on stopping of hemorrhage, he would like to draw attention to a series of experiments published in the *Correspondenzblatt für Schweizer Aerzte* a few months ago, from the clinic of Professor Kocher, in Berlin. Fonia, an assistant of Professor Kocher, has studied the question of coagulation of blood, and found that the blood plaques cause the coagulation by means of a ferment contained in them and freed by their destruction. Therefore, he separates the plaques from the rest of the blood, and prepares them so that they keep. They form a brownish powder called coagulen. This is pressed against the wound by means of a piece of gauze and parenchymatous hemorrhage and small vessels stop bleeding at once. Coagulen is in the open market now.

Dr. S. A. Friedberg has been more concerned with the postoperative use of pituitrin. He has been using this drug at the County and Presbyterian hospitals for a little over a year, and his results have been uniformly good, with the exception of two cases, where there did not seem to be any beneficial result from its use. He operated on a case five days ago, and thus far this patient has required two injections, which have partly controlled the bleeding, but the patient is still expectorating blood. Dr. Friedberg admitted that there is a good field for the anteoperative use of pituitrin, and so far as the postoperative results are concerned, they have usually been good with him also.

Dr. Robert Sonnenschein said that during the last five or six months he has had pituitrin used as a prophylactic measure in practically every private case operated. It was used fifteen to thirty minutes before operating, the dose being one-half cubic centimeter to children, and one cubic centimeter to adults. It would perhaps be unfair to say that it was merely coincidental, but in every case in which it has been used the hemorrhage has been very slight. In view of the fact that the administration of the drug carried with it practically no danger whatsoever, it would seem to him a good proposition to use it preliminary to operation. As Dr. Friedberg had said, in cases at the County Hospital the postoperative treatment has also been materially benefited.

Dr. H. S. Gradle said that the use of pituitrin cannot be limited to the practice of rhinologists alone. He used it in the gluteal muscle before resection of the tear sac, and did not think it was coincidental that he was able to make a very clean dissection, with practically no bleeding at all. He has never seen a tear sac operation where the field was so free from blood as in that case. In addition, he believes the drug will be found of value in operations for hemorrhagic glaucoma.

Dr. Otto J. Stein asked if any of the cases reported had been followed long enough to know if there was any bleeding some time afterwards. That is, if there was any recurrence of hemorrhage. It would be of interest to know this. Following the use of many of these things, sometimes there is a bleeding that takes place some time afterwards. Also, he would like to know if the essayists had any particular experience with bleeding of other nature, not necessarily connected with any surgical work. Probably their experience has brought them into other fields of severe bleeding, coming on from various causes. These questions are of interest to all.

Dr. Walker asked Dr. Kahn if he had had any experience in cases of hemophilia or diabetes, in which there was liable to be a large amount of hemorrhage, such as an operation for adenoids or tonsils.

Dr. Norval H. Pierce asked Dr. Kahn if he has used atropin or scopolamin in connection with pituitrin. Have these drugs any influence on the pituitrin?

Dr. E. H. M. Griffiths said that pituitrin is his hobby. He has used it a great deal in abdominal surgery during the last four or five years. Speaking about hemorrhage in operations, he thinks that Cesarean section is the most bloody operation, but by the use of pituitrin he has been able to perform it with very little loss of blood. He uses pituitrin in Cesarean section in the following way: One cubic centimeter is injected about half an hour before operation. At the time the patient is put on the table she is given another cubic centimeter, or fifteen minims. Immediately following the operation another cubic centimeter is given. This may seem an awful dose, but he does not think so. This is repeated at intervals of four to eight hours following the operation. When pituitrin was given in this way, there was practically no hemorrhage, temperature or shock; it was never necessary to catheterize the patient. However, he and his associates have been working on a different principle. They know that pituitrin does stimulate the involuntary muscles. Sajous claims that it acts by its stimulation of the adrenalin system, and that that is the reason for the rapid coagulation of the blood. Dr. Griffiths has also used pituitrin in other laparotomies, with wonderful results.

Regarding its effect on blood pressure, he has found where there is hypoadrenalism, pituitrin has increased the blood pressure. Where there is a decrease in adrenalism, it decreases it; and there are contraindications for the use of pituitrin.

Dr. N. Schoolman had read Citelli's article in the *Zeitschrift,* and in that article pituitrin was reported as having been used in various cases for the control of hemorrhage, not only in operative cases, but also in subcutaneous hemorrhages, with good results—in hemoptysis and other hemorrhages. Citelli claims that it acts on the involuntary muscles, and its various manifestations throughout the system are explained thereby. He has found that it acts better while operating on an organ where the blood vessels have a well developed musculature, while in organs where there is not a well developed musculature its action is not so good. Therefore, he has said, in operating on the lower turbinate, where the musculature of the blood vessel is better developed, the constriction is greater and the effect is better than when operating on the septum. He asked if this observation was borne out by the essayists.

Dr. Kahn replied in the affirmative.

Dr. Schoolman said that the action of pituitrin, quoting Citelli, is similar but not at all identical to that of adrenalin, and is different in that the action of adrenalin is rather intensive and rapid. It is followed also by very intensive and rapid reaction, and therefore the thrombus forming through the intensive, very short period of constriction is swept away by the rapid onwash of the blood during the reaction, whereas with pituitrin the action is slow and holds on for a long time. The reaction is correspondingly slow, and therefore the thrombus has had time to form, and the onrush of the blood following it has not such an impetus to sweep it aside.

Dr. Gordon had said that pituitrin increases the strength of the heart beat, and decreases its frequency. It undoubtedly does have a vasomotor constricting effect; it undoubtedly has an effect on the involuntary muscle cells.

The question of coagulability is a very interesting one. The speaker had mentioned the subject to a laboratory man, and he made the remark that maybe the base in which the pituitrin is dissolved has something to do with the coagulation. He thought that there was trikresol in most of the ampules. Whether there is anything in that or not, the speaker could not say. It might be well to try other solutions, or call it to the attention of the manufacturers.

Dr. Gordon, in closing the discussion on his part, said the remarks of the last speaker were rather more a discussion of Citelli's paper than the points brought out by Dr. Kahn and himself. Their desire had been to impress upon the members the coagulation power of pituitrin.

Regarding Dr. Holinger's remarks, he wished to reiterate Francini's statement. We have all been working with calcium salts, and have obtained more or less good from their use. Francini, in 1910, while studying body metabolism as influenced by the ingestion of the extract of the posterior lobe of the hypophysis, found that there was during its use a decrease of the magnesium and calcium salts in the tissues, while there was an increase of these salts in the blood stream. The speaker mentioned these facts to show how pituitrin probably acts.

Dr. Kahn, in closing the discussion, said that he hoped to continue this work, in association with Dr. Gordon, and bring a further report to the society.

As to Dr. Holinger's remark about fifteen minutes' wait, of course, when you have severe hemorrhage, waiting fifteen minutes for the effect of a drug is important. But pituitary extract can be used as a prophylactic in operative procedures in those cases where hemorrhage is expected, and thus the difficulty overcome. The speaker did not claim that the drug is a cure-all. You may get cases in which you will have to use blood serum following pituitrin. They did not claim that it was infallible. They only claimed that the blood does coagulate more rapidly under pituitrin.

As to the use of the drug in hemophilia and diabetes, he could not report about that at this time. His own experience with hemophilia has been limited to only one near hemophilic case, but Dr. Gordon had one case in which the coagulation time was fifteen minutes, brought down to three minutes. Those are the only cases of hemophilia in which he knows that the drug was used. As to its use in diabetes, he knows nothing of it.

Answering Dr. Pierce's question, he has never used atropin or scopolamin with pituitrin.

Paper: Tuberculosis of the Larynx.*

By J. Holinger, M. D.,

Chicago.

DISCUSSION.

Dr. O. J. Stein wanted to take exception to the statement that external surgical procedures—and the essayist mentioned laryngofissure—are objectionable. He feels that there is a field for this operation in certain forms of localized tuberculosis of the larynx. Without going into details, his experience has led him to feel that well defined local tumefactions of a tubercular character can be eradicated, and the probabilities of a dissemination of the disease in the larynx, or possibly elsewhere, can be mitigated.

In this connection, he wanted to ask if any of the members had had any experience in the use of tuberculin locally in the larynx. He did not think that was mentioned in the paper. There has been a good deal of work done, especially by men who are doing a great deal of work with tuberculosis, as those in Colorado and California. The application of tuberculin, especially the old Koch tuberculin, upon the diseased tissues has led these men to make some reports of very striking results. He has tried it a few times, but was not in a position to give a report of them at this time.

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*See page 327.

Dr. E. P. Norcross thinks there is a very pessimistic opinion held as to the curability of laryngeal tuberculosis. This may be due to the great variation in statistics dealing with the frequency of this complication of pulmonary tuberculosis. The reason for this variation is that cases are not diagnosed early. We wait until the patient complains of a little hoarseness or dryness in the throat, or, if they are examined, the changes are not recognized, and possibly the pulmonary end is so intense that it overshadows the laryngeal. The speaker thinks that if the cases were all examined carefully, in the same way that we are taught to recognize early changes in the lung, the percentage of cases of consumptives having tubercular laryngitis would be greatly augmented, and naturally, then, the percentage of cures would also be augmented. One cannot help but believe that there are many cases of tubercular laryngitis never diagnosed that heal spontaneously, just the same as the lung trouble may heal. His point is this: If all the consumptive patients were carefully examined regarding the condition of the larynx, the percentage having this involvement would be great, and the cures would naturally rise also.

Dr. O. T. Freer agreed with Dr. Holinger concerning the uselessness of external operations in most cases of laryngeal tuberculosis. This is the conclusion of Dr. Nils Arnoldson, of Stockholm, who has made an exhaustive study of the matter. He says (*Archiv für Laryngologie,* 1913, page 46): "In the literature of later years little belief is expressed in the possibility of material benefit from the external operations, least of all from total extirpation of the larynx." Gluck, quoted in Arnoldson's article, however, advises external operation where all of the tubercular disease may be extirpated by it, and states that in many cases laryngeal tuberculosis is merely an active focus of localized tuberculosis.

Undue optimism in regard to recoveries obtained by endolaryngeal surgery must also be avoided. Where a tubercular focus may be excised with uninfected tissue about it, as in the case of tuberculosis of the epiglottis confined to the periphery of its free pharyngeal portion, a permanent cure may be obtained. But where the disease has entered into the tissues of the body of the larynx itself, as in ulcers of the cords, aryepiglottic folds, ventricular bands, and especially where there is tubercular, infiltrative chronic edema or perichondritis, complete extirpation by endolaryngeal cutting operations is impossible, for there are always miliary foci scattered far about the main seat of the disease, which lie in apparently healthy tissue, and which reproduce the tubercular process. This may be seen especially well in nasal tuberculosis, where an apparent complete removal of the tubercular focus is so easy, for in spite of such removal a return of the disease is the rule.

Dr. Freer agreed emphatically with Dr. Holinger that laryngeal tuberculosis is often primary. There never has been proof advanced for the often repeated assertion in the textbooks that laryngeal tuberculosis always follows pulmonary tuberculosis, and is evidence that a pulmonary focus exists. Dr. Freer always examines the chest in cases of laryngeal tuberculosis, and has often, even in advanced cases, failed to find any sign of pulmonary disease. To assert that, nevertheless, a primary pulmonary focus must be there simply because there is laryngeal tuberculosis, is merely an unproved, dogmatic statement. Later, of course, the lung nearly always becomes infected with tuberculosis in the form of aspiration tuberculosis.

Dr. L. E. Gordon wished to subscribe to what the essayist said, but would include nasal troubles. The essayist mentioned pharyngitis, but not the nasal affections that may be found in these cases. Dr. Gordon's experience has led him to the conclusion that the larynx is not such a vulnerable part of the body, and would be able to overcome tubercle bacilli invasions from the lungs if the upper respiratory passages were normal. His experience in operative procedures upon tubercular patients has been limited to those for correction of deformities in the nose and throat. He has seen a number of cases that were on the sanatorium waiting list clear up after degenerated tonsils were taken out, deformities in the septum or turbinal bones corrected, and this observation has led him to the conclusion that the larynx is not very susceptible to invasion from the lungs, provided the upper respiratory passages are normal.

Dr. E. L. Kenyon wanted to say just a word in confirmation of Dr. Norcross' position, and to go to a little further. He is inclined to think that the laryngologist does not apply the same intelligence to the examination of these cases of tubercular laryngitis as the internist does to the pulmonary condition. The attitude of the physician treating pulmonary tuberculosis is largely the attitude of prophylaxis. He says: Attack the tuberculosis of the lungs before the lungs are attacked with the tuberculosis, as it were. In other words, so treat your patient as to increase his resistance. The speaker believes that laryngeal tuberculosis as a primary proposition is extremely rare, because he believes that the conditions necessary to produce tubercular laryngitis are exceedingly rare, excepting in connection with pulmonary tuberculosis. In cases of pulmonary tuberculosis, one is able to watch the development of laryngeal tuberculosis if he watches the larynx. Not only that, but he is able to see the conditions in the larynx which predispose to pulmonary tuberculosis. He sees the local laryngitis which is tending to result in abrasions of the mucous membrane, in which abrasions the tubercle bacilli become engrafted. The time will come, in the opinion of the speaker, when laryngologists will examine every pulmonary tuberculous patient systematically for trouble in the larynx, not once in six months, or once in a long period, but as an essential part of the treatment of the pulmonary condition as frequently as necessary. Watch will be kept of the larynx, and primary disturbances will be treated with the purpose of avoiding laryngeal tuberculosis. That will be the advanced future attitude of the laryngologist in reference to laryngeal tuberculosis.

Dr. Kenyon has recently come to feel that the development of laryngeal tuberculosis is dependent more than we have heretofore thought upon cough. He is coming more and more to feel that cough is a primal factor in the development of laryngeal tuberculosis, because cough involves the most violent action we have in the larynx, and it is this violent action in the larynx, taken with a chronic laryngitis, that he feels is responsible to a great extent for the infection of the larynx with the tubercle bacillus. In the act of coughing the breath is taken in, the vocal cords are jammed together, and are held tightly, while the chest is contracted on the air column in the bronchi and trachea. The vocal cords must be held so tightly that the air does not pass through them with the contracting chest. Then the larynx is quickly opened and the air bursts through. In that process of coughing the vocal cords are not gently held, as in talking, but are held so tightly that it is possible to produce an abrasion of the cord and thus encourage the infection to find lodgment upon the cord. Likewise, the movement of the muscles in the arytenoid region are more violent in coughing than in talking. Here, owing in cases of pulmonary tuberculosis to the almost universal presence of infiltration, the flexibility of the mucous membrane has become reduced, and abrasions in which tubercle bacilli may find lodgment are likely to be produced. So the speaker thinks that this violent action of coughing may explain a good deal of laryngeal tuberculosis.

Dr. H. Kahn said that one point to be considered in the surgical interference in laryngeal tuberculosis is whether the condition is one of open or closed tuberculosis. Surgical interference in laryngeal tuberculosis where there is temperature is absolutely contraindicated. That is the real crux of the situation. When temperature is present, only palliative measures are indicated.

Regarding external operations, Hajek, in the *Medicinische Klinik*, 1912, page 385, has reported excellent results with tracheotomy. The larynx is placed absolutely at rest for a period of some length, and most of the cases recovered.

There is no dearth of sanatoria for the treatment of the indigent tuberculous in Chicago. Oak Forest has now over six hundred patients, and will soon have room for two hundred more. The Chicago Tuberculosis Sanatorium will soon open up with nearly a thousand beds, so that the poor can have all the necessary treatment. There are many other sanatoria for the middle class, who are able to pay something for their treatment.

Dr. Holinger, in closing the discussion, said that he knew that his standpoint on the question of laryngofissure was not shared by all members, but all his cases operated by laryngofissure did not do at all well. The impression he received was that the excitement of the operation and after-treatment pulled the patient down.

The speaker noticed that he had been misunderstood by

Dr. Norcross. He said that, on the whole, the prognosis of laryngeal tuberculosis is good. The main point is early diagnosis. Dr. Norcross spoke about early examinations—not only early, but regular examinations—of the larynx of consumptives. The speaker has been many times in a very disagreeable position, when patients suffering from tuberculosis of the lungs came and complained about their larynx. Their physician contended that the hoarseness, etc., amounted to nothing, and did not need special attention. Add to that the changeability of the symptoms, the patients sometimes having absolutely no symptoms for weeks. What should the specialist say and do when suddenly bad laryngeal symptoms appear? Is it his duty then to protect the general practitioner before the patient? How is he going to justify serious therapeutic measures before the patient?

As to the frequency of diseases of the nose in tuberculosis of the lungs, it is textbook knowledge that tuberculosis of the lungs and larynx is three and four times more frequent in patients who have irregularities in the nose than in those with normal noses.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

Meeting Held December 22, 1914.

DR. OTTO J. STEIN, THE PRESIDENT, IN THE CHAIR.

Probable Syphilitic Ulceration of Left Tonsil.

DR. W. G. HATCH, Rockford, in presenting this case, said that the family history was absolutely negative. About six months ago the patient complained of trouble with the throat, accompanied by swelling, at which time the speaker first saw him. There was then a very large ulceration of the left tonsil present. The glands were very hard and indurated on both sides. He did not feel that the case was operative, and felt sure that it was malignant. He did not want to make a section, because he did not wish to subject the patient to the dangers of metastatic infection. He did not have a Wassermann made, because his experience with this test has not been particularly happy. He put the patient on treatment with iodids, and the condition commenced to clear up. The glands are getting smaller and the ulcers seem to be healing. The speaker was inclined to think the condition was due to syphilis.

DISCUSSION.

DR. NORVAL H. PIERCE believes all such cases as the one presented should be subjected to microscopic examination immediately. The danger of opening up the lymphatics by operating to take out a piece of such tissue is very slight; in fact, hardly exists. If we wish to seal up the lymphatics immediately afterwards, we can seal over the wound with the cautery, and this will obviate any danger that the doctor who reported the case seemed to believe exists. It is not a matter of whether a case is operable or not; it is a matter of making a diagnosis. There are several things that come into thought at this point, as to whether it can be carcinoma or actinomycosis or syphilis—even tuberculosis, although, of course, it does not have that appearance; yet tuberculosis in exceptional instances may so very closely simulate carcinoma that the differential diagnosis can only be made by microscopic examination. If the diagnosis of syphilis is made positively, one is very much more apt to be a little more heroic in treatment. The case does not seem to be inoperable now, although the involvement of the glands on both sides of the neck would seem to indicate that the process had gone to a point where the issue of an operation would be very doubtful.

However, the point on which he wished to be understood was that all these cases should be immediately subjected to microscopic examination. The danger from taking out a piece of such a growth is not at all great; in fact, it should not stand in the way for a moment of making the diagnosis. If we wish to seal up the lymphatics, we can do so with the actual cautery, so that danger is altogether done away with.

Carcinoma of Upper Jaw, With Resection.

Dr. Joseph C. Beck showed a patient who had had a carcinoma of the left upper jaw, which the speaker diagnosed by microscopic examination. It extended somewhat on the anterior surface of the superior maxilla when seen, as the condition had lasted for eight months. He wished especially to refer to the operation in this case, particularly the technic. A resection of the upper jaw without external incision was made, as in an antrum operation. He excised the inner surface of the cheek wide of the tumor. Then, internally, in the midline, below the upper lip, just under the nose, raising a flap as in the Loewy operation, he resected the superior maxilla posteriorly, including the palatal bone. It was not necessary in this case to remove the lateral wall of the nose, or the floor of the orbit, because they were not involved. The carotid artery was not ligated at the beginning of the operation, but on account of a good deal of bleeding a temporary compression, according to the Crile method, was performed, which resulted in practically no bleeding during the remainder of the operation. After the operation was completed, small particles of the tissue from the operative field were excised and saved for microscopic examination. This tissue was found subsequently absolutely free from carcinoma. Then a layer of gauze was placed within the cavity, and on top of that ten milligrams of radium element, some more gauze, and the soft palate sutured temporarily to the side of the cheek to control bleeding. The radium was allowed to remain in for forty-eight hours. The gauze was removed next day and replaced three times within a week, and then left out. Since then the sloughs have been coming away, and there is still a portion of the slough left in the anterior wall. It is now four weeks since operation, and the patient was shown because he was leaving for his home next week. Perhaps it would be of interest to see him some time in the future with no recurrence.

In this connection, Dr. Beck showed a stereoscopic photograph of a patient operated on seven years ago by the external method, and the patient is alive and in good health at the present time. The operation, however, leaves quite a different face from what the patient just exhibited has. Dr. Beck believes that, as a rule, the internal operation can be very nicely done in these cases. He employed the burr almost exclusively in the removal of the bone, and it was very easy to manipulate. Dr. Beck expects to have a prosthesis made with an artificial denture attached, but this must not be worn until all postoperative reaction has disappeared.

Tuberculosis of Pharynx and Soft Palate.

Dr. J. Holinger presented two cases. The first patient came to Alexian Brothers Hospital complaining of indefinite throat trouble. On examination, there was an area just in front of the right tonsil, about the size of a quarter, swollen, and of irregular surface. Pieces were removed for examination which showed nothing indicative of syphilis or carcinoma. The process progressed very fast, and in about two weeks the whole half of the soft palate was involved, in another week the whole of the soft palate and a part of the hard palate. The uvula was eaten out in characteristic manner. Pieces removed at this time for examination showed typical tubercles. At the same time word came from Dr. Rettig, the internist, that the lungs had râles all over. In the sputum tubercle bacilli were found. The man at that time looked very robust and healthy, which appearance he has lost. The whole soft palate, pharynx and epiglottis are eaten out by the tubercular process. It extends up into the nasopharynx and down into the larynx and esophagus, as far as we can see. Other isolated foci are on the inside of the lower lip. This is not by any means a frequent condition. In the *Centralblatt für Laryngologie* this year there have been four or five cases mentioned of tuberculosis of the pharynx, all of them developing very slowly, not progressing in many months as far as this one had in weeks.

Rhinoscleroma.

This patient came to Alexian Brothers Hospital with both nostrils absolutely closed. Dr. Holinger could not make the slightest impression with the probe on either the turbinals or septum. The septum was equally swollen on both sides, as were the turbinals. The cocain did not shrink the swellings. The speaker forced some packs of cotton with mercury salve into the nose, repeating that every day for many weeks, and with this treatment the swelling of the septum and turbinals went down some, and at the present time the nose is comparatively free. Several large pieces were cut from the septum, but unfortunately were stained wrongly, and the speaker would have to wait for a few days longer before getting a report. If, as the speaker thinks, it is a case of rhinoscleroma, it can be only the beginning, because the trouble only dates back to last summer. The patient is from Ruthenia. The geography is, as the members know, of importance in rhinoscleroma.

DISCUSSION.

Dr. S. A. Friedberg asked Dr. Holinger if there was anything characteristic on palpation of the nose in the case of supposed rhinoscleroma.

Dr. Holinger replied that the nose was rigid, and could not be compressed at all.

Dr. Friedberg said he had so far seen three cases of rhinoscleroma at the County Hospital, and at the present time has one under observation that has been in the hospital for a couple of years. One case which he recalled had practically the same characteristics as the one presented by Dr. Holinger. The case to which Dr. Friedberg referred had a combined nasal and laryngeal involvement. The larynx showed the typical subglottic swelling. It was necessary to perform a tracheotomy and the man wore a tube for over a year. After the tracheotomy tube was removed, an intubation tube was worn for a short time. At present the patient is without any tube, and is getting along nicely. The scars can still be seen in the larynx, but there does not seem to be any progression.

Regarding the bacteriologic findings in these cases, we know that we have an encapsulated bacillus resembling the Friedlander bacillus to a great extent, and for that reason some doubt has been cast on the fact as to whether this is the absolute etiologic factor. The speaker thinks more is to be demonstrated from the sections. If both the nose and larynx are involved, it is usually easy to make the diagnosis in a good many of the cases. It would be interesting to see what the specimens would show.

Dr. George W. Boot, referring to the first case shown by Dr. Holinger, of tuberculosis of the pharynx, said that not long ago he saw a woman with what he believed was tuberculosis of the pharynx. She gave a history of having had trouble for twenty years, which had been diagnosed as syphilis at various times, but treatment along antisyphilitic lines did no good. The speaker considered the case one of tuberculosis of the pharynx, and ordered very small doses of tuberculin once a week. At the end of about two months the throat is feeling better than for a long time, and looking better. The process has healed over, with the exception of a small ulcer on the right side. She has gained many pounds in flesh under this treatment. The Wassermann was negative.

Carcinoma of the Throat Involving the Esophagus. Miliary Tuberculosis.

Dr. George W. Boot exhibited, first, a specimen from a carcinoma of the throat, involving the esophagus, left side of the pharynx and left side of larynx.

Second, larynx from a case of miliary tuberculosis. This patient, a man, came to Cook County Hospital suffering from a severe laryngitis, so that the speaker could not get a satisfactory view of the larynx. He did not return to the hospital for three or four days, and in the meantime the man had died. At the last he had a great deal of dyspnea, so that the internes did a tracheotomy, rather high, cutting off the cricoid cartilage. At the postmortem there was found tuberculosis of the lungs and larynx. There was a shallow ulcer on the epiglottis, and below the vocal cords there was an ulcer on either side, with quite a number of miliary tubercles.

Bony Tumor Filling Nasopharynx, With Exhibition of Photograph.

Dr. L. W. Dean showed a photograph of a bony tumor that completely filled the nasopharynx. The soft palate was not involved, but it was pressed downward and forward, so that the tumor could be seen in the nasopharynx. The tumor could be felt as a hard bony mass. Entrance could not be made into the nasopharynx, in order to tell just where the tumor grew from.

Operation.—Tracheotomy; anterior posterior incision in the midline of the roof of the mouth, severing the soft tissues down to the bone, and the soft palate to the tip of the uvula. These tissues were retracted laterally and the posterior third of the hard palate removed. The growth was found growing from the upper surface of the hard palate and from the posterior surface of the vomer. The palatal wound was closed by Brophy's method of closing posterior cleft palate. The closure was complete. Speech perfect.

The microscopic diagnosis was osteoma. Six months later there was no recurrence.

DISCUSSION.

Dr. Oto J. Stein asked how hard the bone was.

Dr. Dean replied that it was not ivory-like; it was a crackling affair.

Dr. Stein asked if the nose was involved.

Dr. Dean replied, not at all.

Dr. Stein said that, as a rule, osteomata of the nose are extremely hard.

Surgical Anatomy of Temporal Bone, With Lantern Demonstration.

Dr. George E. Shambaugh stated that every otologist of today aims to be an aural surgeon, but that this was not the case even a few years ago. During the earlier days of the specialty of otology the complications resulting from mastoiditis were usually taken care of by a general surgeon. This state of affairs has largely disappeared in this country, and there are very few first-class general surgeons who are still willing to undertake the special surgery of the ear. Some of the general surgeons who have not kept in touch with the advances of modern otology are still unaware that the type of operation which the specialists are able to do for the cure of chronic, as well as acute, mastoiditis is something quite different from what the general surgeon is prepared to undertake. In England it is still not uncommon for some general surgeons to do mastoid work; indeed, some valuable contributions to the surgery of the mastoid have been made by general surgeons in England, who have devoted a good deal of their energy to the question of mastoid surgery. In Germany it seems that mastoid surgery has been taken over entirely by the aural surgeons, although as late as fifteen or twenty years ago the general surgeons still did a large amount of the mastoid surgery that was being done.

Everywhere at present we have come to realize that the complications which arise from suppurations of the middle ear, including mastoid disease, labyrinth infection, and the intracranial complications, are taken care of more efficiently by the aural surgeon than by men engaged in general surgery. This means, of course, that the specialist in otology must master the details of the regional anatomy of the ear, in order to do this work properly.

As a matter of fact, there is only a small proportion of ear cases where surgical interference is necessary, and yet every otologist feels, and rightly so, that he should be prepared to take care of those complications which develop in the course of suppurative middle ear disease. In order to be prepared to do this work the aurist must be trained not only to handle a chisel in a dexterous way, and to ligate vessels, but it is absolutely necessary that he should master the regional anatomy of the ear. This is not such an easy thing to do, as many of the men in the audience could testify. The conditions presented by pathologic changes in the mastoid make it necessary for one to have a perfectly clear mental picture of the various relations, if one is to operate without injuring important anatomic structures. Surgical anatomy of the ear can never be acquired fom textbooks or descriptions. One might read all of the descriptions written on the anatomy of the ear and study all of the drawings that have been made of this region, and yet, if he has not actually handled anatomic preparations showing the relations, he will find himself very inadequately prepared when attempting to operate on the ear. The method usually employed in gaining this anatomic knowledge is by beginning to do the operations on the cadaver. This, however, is not the best way to acquire a mental picture of the anatomic relations of the mastoid, for the reason that most of the relations are destroyed while attempting to expose this or that structure. One may operate upon a great many different temporal bones in this way and still have a very hazy idea of the relations of the various structures. The best way of acquiring a mental picture of the anatomy of the ear is by studying sections made through the temporal bone, each section devised so as to bring out clearly certain definite relations. Sections made at random through the temporal bone will be of very little assistance. The speaker recalled looking over, a few years ago, a series of sections made in this way. He was surprised to see how few of the sections brought out relations which were of any practical value. The variety of preparations which one can make of the temporal bone is very great. The speaker spent a great deal of time several years ago in working out a set of preparations, each devised so as to bring out certain definite relations. In all he made something over fifty different preparations. In the lantern demonstration which was to follow he would show some of these preparations.

In closing his introductory remarks, the speaker called attention to the accidents which the general surgeons have so frequently had when operating on the ear; accidents which the carefully prepared aural surgeon very rarely has. An injury to the facial nerve by an aural surgeon is now extremely rare. It is the impression of the speaker that the amount of aural surgery done today is less than what was done fifteen or twenty years ago. He attributes two reasons for this: First, that the suppurative diseases of the middle ear are better taken care of now, since the public recognizes the danger in running ears; the other reason is that the aurists are able to distinguish much more definitely among the cases of chronic suppurative middle ear trouble those where the danger of a complication is imminent, and those where the danger is very remote. The percentage of cases where in chronic purulent otitis media an operation is indicated is relatively small. There was a time, after the danger from chronic running ears became recognized, and when the differentiation was still hazy between cases which were likely to have complications and those which were not, that otologists were operating on a good many of the nondangerous type. This period has now passed, and a careful examination of the ear readily distinguishes, as a rule, between cases which require a radical mastoid and the more common type of chronic running ears where nothing more than the local treatment need be carried out.

Paper: Hammond's Mastoid Skin Grafting—A Preliminary Report.*

By Frank Allport, M. D., and Alex. S. Rochester, M. D.,

Chicago.

DISCUSSION ON THE PAPERS OF DR. SHAMBAUGH AND DR. ALLPORT.

Dr. Norval H. Pierce asked Dr. Allport if these grafts to which he referred were all primary grafts, to which Dr. Allport replied yes.

Dr. J. Holinger wished to support Dr. Shambaugh emphatically in his statement that the otologist ought to operate these cases, not the general surgeon, and hoped Dr. Shambaugh could find a way to incorporate this statement into the laws of ethics of the profession. He wished to emphasize this fact, because the present condition is an evident injustice to otologists. It lowers them to the position of routine treaters of running ears. It effaces a great deal of enthusiasm if the surgeon takes away the ideally and financially interesting work. We have all seen the results of surgeons operating on ears in the form of facial paralysis, destroyed hearing, etc., referred to by Dr. Shambaugh.

With reference to the planes in which temporal bones should be cut for studying the anatomy, he wished to refer to one plane of cutting which gives much more information than others, namely, the plane parallel to the tympanic cavity and through the eustachian tube. It takes quite a good deal of thinking in order to bring that plane into position. You have to open the middle ear through the tegmen tympani and study accurately the position of the saw before you start cutting, but when you succeed in splitting the eustachian tube in half and at the same time not injuring the tympanic membrane, you will be surprised how clearly you see the position of the aditus ad antrum, of the antrum, and of the facial nerve relative to the parts in the mastoid process, and relative to the labyrinth.

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*See page 335.

Regarding Dr. Allport's paper, he wished to remind him that every one of the points brought out are set down in the paper of Siebenmann, in the first number of the *Berliner klinische Wochenschrift*, in 1893. What Ballance has to say about secondary grafting can all be found there. The French and English authors at that time not only criticized, but actually laughed at these endeavors of the German and Swiss authors in dealing with chronic suppurations. The speaker heard the ridicule that was manifested against all these points when he was in Paris. Ballance, and others referred to by Dr. Allport, came long afterwards, and Dr. Holinger does not think it just that they should get credit for things that were brought out many years before they considered the matter. It ought to be a scientific principle to give credit to whom it is due.

The speaker has done a good deal of secondary skin grafting—as early as 1893. Not long ago he saw the first patient he operated upon in May, 1893. The ear was still dry, and the hearing good.

Dr. George W. Boot had been very much interested in the lantern slide demonstration of Dr. Shambaugh. A few years ago he saw a mastoid in an infant where the bulging of a subperiosteal abscess was in the fossa triangularis. The infant was about seven days old. There had been no discharge from the external auditory canal.

Dr. Joseph C. Beck said that he thought if Dr. Holinger would give an outline of how the section he referred to is made, probably some of the men present would make such sections for themselves. Pifl, of Prague, had shown Dr. Beck how to make them by taking a line from the tip of the petrous portion of the temporal bone as one landmark, and the tip of the mastoid as the other, sawing through the petrous portion of the temporal bone. In this way you get that section just about right, and you will find that in making a number of these sections you will just about get the outline that Dr. Holinger mentioned. However, the speaker doubts very much whether you could get the information from only that one section, as from those shown by Dr. Shambaugh. He felt very much indebted to Dr. Shambaugh for his presentation. While it was perhaps not exactly new, yet it is most important for us to rehearse and see these specimens.

Regarding Dr. Allport's paper, no matter who has the right to priority in Germany, at least, so far as the speaker knows, Ballance is the man who has made skin grafting in mastoids the operation it is at the present time. Perhaps it is the fault of the readers—that they do not read so much of the German literature. At any rate, it is the excellent work of Ballance we are always connecting with our work in mastoid surgery. That does not mean that we would like to take anything away from Germany.

Dr. Beck has employed skin grafts ever since he learned to do the radical mastoid operation, using them, giving them up, and taking them up again, doing them in every way suggested, and when Dr. Hammond showed his method at the Otological Society, he tried his method, and gave it up, and is now using the primary skin graft. After smoothing the bone of the mastoid cavity as much as possible, immediately placing large grafts—two, and at most three, in number. He has never scraped or burred the inner wall of the middle ear, or any part therein. He believes that to be unnecessary. It is very dangerous, and he does not think it should be done. The speaker felt the members were indebted to Dr. Allport for his exposition of the subject, even if it is old.

Dr. Allport, closing, said that he did not intend to present anything new to the society. There is certainly nothing new in skin grafting, and his object had merely been to give a résumé of the subject.

Paper: Choanal Fibroma.*

BY NORVAL H. PIERCE, M. D.,

CHICAGO.

DISCUSSION.

DR. GEORGE W. BOOT wished to show three specimens in connection with Dr. Pierce's paper, the first of which he thought would fall in Dr. Pierce's classification. It was removed from the left nostril of a man, about thirty-eight years of age. The growth could be seen in the nasopharynx. It involved some of the anterior ethmoidal cells, and came from the maxillary sinus. It was removed by evulsion and taken out through the nose. Sections showed it to be a fibrous polyp.

The second specimen was that of a postnasal tumor, which, when removed, the speaker thought was a fibroma, but on cutting the sections it proved to be a fibrochondroosteoma. It was attached to the base of the cranium, and the speaker experienced great difficulty in getting it out. No. 8 wire in the snare failed to make any impression. Finally, he cut it loose from the base of the skull with the forceps, and finished the dissection with Killian's bent knife.

The third specimen was one which was removed from a child, three and one-half years old. The growth could be seen through the mouth, and the speaker thought it was a case of adenoids. After removal, section showed it to be a sarcoma. The child had a very prompt recurrence, was taken from the hospital, and died.

DR. OTTO J. STEIN has always been under the impression that choanal fibromas had one attachment, as stated by the essayist. He had a case some years ago that he operated, and at that time thought there were two attachments. He presented the specimen—a large one, about two and a half to three inches long—to the society, but in discussion (at St. Louis) the members finally convinced him that one of the attachments was nothing but an adhesion that had taken place. Dr. Pierce said that one of his cases had an adhesion, but he also stated that he had one that had no adhesion, and asked Dr. Pierce if that was not what he had said.

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*See page 332.

Dr. Pierce replied that the case referred to had no adhesions. It is said that these tumors do not form adhesions, as a rule.

Dr. Stein, therefore, still had some hope that his case did have two attachments instead of one and an adhesion, as the members had convinced him at that time.

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XXVIII.

SUSPENSION LARYNGOSCOPY AND ITS ACCOMPLISHMENTS.*

By R. C. Lynch, M. D.,

New Orleans.

Can you imagine the peculiar sensations that must have greeted Prof. Gustave Killian when he viewed for the first time the larynx of a cadaver brought into view by a tongue depressor, placed over the tongue and epiglottis, the handle of which was swung from a support at the side of the table, the subject's head hanging free?

To sit comfortably in front of the open mouth and to view deliberately the larynx, without the "time honored" fatigue of either your arm or that of an assistant, must have created a certain sensation of joy and satisfaction hard to describe. This was the birth of suspension laryngoscopy, some time in the winter of 1909. According to Killian, much experimental work was done until the method was decided to be sufficiently developed for presentation to the laryngologic world at the International Laryngological Congress in Boston, in 1911.

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*Candidate's thesis to the American Laryngological Society.

From this period until the present time the method has been used by laryngologists the world over, and as a natural consequence there began to appear varying views and modifications.

At a meeting of the American Laryngological, Rhinological and Otological Society, held in Washington, District of Columbia, in May, 1913, I saw Dr. Wolff Freudenthal demonstrate the apparatus, and later had the pleasure of viewing the larynx of a case suspended by him, at the Beth Israel Hospital, New York City. I became enthused with the possibilities of the method and purchased an instrument of the latest Killian design.

I began the use of the suspension laryngoscope, and with the increasing acquaintance I dreamed more and more of its possibilities, but at the same time realized that much was lacking in what I had considered a "perfect" instrument. I was soon impressed with the fact that the range of usefulness of the outfit would be decidedly limited unless I were able to view the anterior commissure of the larynx in every case. The children gave me but little trouble, but in adult cases I could not see nearly as much as I desired. Small tumors far forward in the anterior third of the larynx were not in view, and try as I might, I could not adjust the instrument satisfactorily. The "gallows," as Prof. Killian has called it, was not long enough; its attachment to my operating table was not straight or square, its motion horizontally was limited, and many times I felt that if it were only four inches longer I could see ten times better. The hook was frail, and after use on an adult case, would have to go to the instrument maker to be straightened. Then I could not gain space enough through the opening to see well, realizing that a Jackson or a Mosher spatula would yield a much broader field of view. The tongue would slip from side to side, and when in the middle line would so fold around the spatula as to convert the field of vision into a tube whose caliber was too small for any use.

To correct these troubles was now my desire, for it was always plain that the principle as proposed and executed by Killian was thoroughly proper and correct. Taking then my goal of acquirement, the anterior commissure of the larynx with a wide open mouth and an unobstructed view of the parts concerned, I set about to surmount the difficulties as they arose and as they appeared to me.

I had made a table top from a cypress board six feet long and eighteen inches wide, fixed with clamps to fit my operating table so that it would be perfectly rigid under all circumstances. At one end a section twelve inches deep and fourteen inches wide was cut out, and hinged to drop at right angles to the surface, this leaving a projecting platform four inches wide and twelve inches long, the purpose of which was to increase the horizontal traveling distance of the gallows, by placing the clamp of the gallows forward of the shoulders instead of behind them, as is necessary under ordinary circumstances. Again, the hinged portion did away with the necessity of having to drag the patient over the head of the table after the sterile goods had been placed, and a most uncanny feeling to a patient under local anesthesia. The table top in its original pattern I still use, and feel that it is one of the very essential units for success. A "wabbly" table is a source of trial at all times, and in one instance my patient actually slipped off, falling to the floor because of the nonbalance produced by the extension of the head beyond the table top, and the body weight coming beyond the center of gravity.

The tooth plate of the mouth gag would invariably stick, its movement—only a quarter inch—was entirely too small to suit all cases, and it was always necessary to make the adjustment before being applied. Again, the vertical opening of scarcely one inch was not as long as the mouth would stretch nor large enough for me to see as well as I might. Accordingly, I had constructed the tooth plate and mouth gag described by me at the twentieth annual meeting of the American Laryngological, Rhinological and Otological Society, in Atlantic City. This modification permitted of an increase of one inch in the vertical and one in the horizontal, the latter being controlled by a screw which was more powerful and accurate, and would not stick and jam. I worked with these modifications for some time, satisfactorily I thought, when one day I could not get away from the milled head of the adjusting screw. I could see it all the time, as one must see the black spots in scotoma; then the platform through which the tooth plate traveled would project into the mouth cavity beyond the tooth line, which interfered very much in the dissecting operations; and finally, while suspending a husky farmer of about two hundred pounds, it bent so decidedly under the strain, that I felt that it was neither safe nor satisfactory.

Again, the tongue on the main frame to which is attached the various tongue spatula and which acts as a guide for the vertical movements of the mouth gag, and which must bear the brunt of the leverage, was found first of all to be of brass and consequently to bend easily, and this would actually occur after nearly every case of any size. Then the screw which was used to operate the vertical movement of the mouth gag was so small that it was at times impossible to move it at all during the various stages of introduction.

I set about to correct these shortcomings by making the frame of the instrument of the shape of a reversed L, with the screw that operates the mouth gag working through the end of a horizontal branch of the L, the advantage being a large screw head that could be grasped well and that could be moved at will, even in the heaviest cases. The tooth plate was made to extend for nearly two inches horizontally, working by a worm gear joint and swivel near the tip. This placed nothing in the mouth cavity beyond the tooth plate, allowed of a wide opening of the mouth and was thought to surmount all of the difficulties. It was this instrument that was shown at the meeting of the Middle and Western Sections of the American Laryngological, Rhinological and Otological Society at Cincinnati. This whole apparatus proved mechanically wrong, and I have mentioned it for that reason. The center of gravity was not in the middle line, consequently the instrument would pull to the side, necessitating the continuous holding of the head by an assistant. The screw moving the mouth gag was pitched too high and would jam so as to be perfectly immovable because the weight was off center. The worm gear joint could not be made strong enough to withstand the weight, and would bend up so as to give but a small opening to the mouth. I will never cease regretting that it was ever displayed.

The instrument that I have been using for the last six weeks has many points in its favor, and seems to be entirely satisfactory up to this time. One realizes that the main requisite for one instrument to suit all cases and conditions is flexibility. I mean by this a wide range of motion in every possible direction, all in excess of what is usually needed, that they may be called upon in the unusual cases.

As my work is done on adults as well as on children, I have felt the necessity for strength and power, to overcome the greater muscle tension met with in most adults. Therefore, the new instrument is very much heavier in all its parts, and is thought now to be able to stand the severest test possible. The main frame is of heavy steel, broader and thicker than the original, mainly to secure a large milled screw used to open the mouth gag in the vertical direction. This has permitted a larger and stronger shaft to the gag, and the thread is pitched lower to give greater power. In addition, the screw is drilled throughout its circumference to permit the use of a lever or handle, as is done in the manipulation of an ordinary jack screw. The mouth gag will now open to a full one and three-quarters inches on the inside, which is much in excess of what is usually required.

The tooth plate of the mouth gag should move freely in the plane of the tongue spatula—a range of motion that is necessary for jacking up the epiglottis and which renders the length of the tongue spatula variable and does away with any projection in the mouth cavity that may obstruct the view. To accomplish this I utilized the principle of a pear-shaped ring attached to the frame, the movement of which is controlled by a thumb screw. By it one can easily introduce the tooth plate well beyond the line of the teeth of the superior maxilla and so move the tip of the tongue spatula at least one and a half inches. This will permit of the use of the shorter spatula and so bring the operator nearer his work. At the same time there is developed a slightly tilting motion to the tip of the spatula, which will tend to elevate the epiglottis well beyond the field of view. Another feature embodied here, and which is an innovation not before mentioned by Killian or others, is the provision of adjustable single or multiple tooth plates. One, two or three can be used, depending upon the size, condition and shape of the superior maxilla under suspension. This feature is of especial service in changing from children to adults and from V-shaped to circular arches. Again, it will permit the fixing of the base of a triangle formed by the tooth plates at two points, the tip of the tongue spatula as the apex, and thus prevent the tongue spatula from slipping from side to side and losing one's view in the middle of an operative procedure.

Finally, the base to which the tongue spatulas are attached has been strengthened so as to meet the most rigid demand. The tongue spatulas have been modified into the form of a slight curve with fixed flanges, to prevent the infolding of the tongue. Also, one spatula has been made with movable or adjustable flanges, but this is more complicated and has not seemed necessary.

TECHNIC.

Perfect relaxation and quiet are fundamental for the work, and the anesthetic to acquire these satisfactorily in the patient will depend upon the condition requiring treatment.

In children, general anesthesia is by far the best and safest, administered by a trained anesthetist, using some form of warm ether vapor. I select ether always for general anesthesia, using the warm ether vapor as delivered by the Cain-McDermott ether apparatus, or by compressed air as is used at the Ear, Nose and Throat Hospital in New Orleans, and insist upon my patient being kept continuously in the surgical state of anesthesia, instead of being allowed to awaken intermittently, as would be the case in ordinary open cone anesthesia; a most unsafe state for the patient and designed to interfere most annoyingly with the work to be accomplished. The bronchorrhea complained of I have never seen in any of my cases, and so far have had no complications of any kind to tabulate.

My anesthesia has been so perfectly satisfactory that I have never felt the necessity of employing either rectal, intravenous or intratracheal anesthesia as a substitute. With the ether being delivered into the mouth through a tube or mouthpiece by compressed air, the anesthesia is under the perfect control of the operator, who can watch this phase of the work—a source of much satisfaction to me. I do not use morphin and atropin before general anesthesia, for I have no desire to benumb the cough reflexes; then, too, many of the cases suffer some from respiratory obstruction, which the administration of morphin may increase still more.

In local anesthesia for adults of a suitable age, I am accustomed to administer morphin, grain one-sixth to one-fourth, and scopolamin, grain one one-hundred-and-fiftieth to one one-hundredth, hypodermically, one hour before operative time. Then with the patient sitting, I apply gently first to the uvula and then to the posterior pharyngeal wall a ten per cent solution of cocain on a cotton applicator. This the patient is requested to spit out. The movements of the parts required in this act are sufficient to procure fair anesthesia of the fauces and postpharyngeal wall. This prevents gagging which, once started, is hard to control. I then drop from a laryngeal syringe about ten drops of a ten per cent solution of cocain onto the base of the tongue, lingual face of the epiglottis and hypopharyngeal wall, requesting the patient to hawk and spit immediately, that none may be swallowed. A rest of two to five minutes is taken, then from five to ten drops of the same solution is dropped upon the tongue, and the patient is requested to cough immediately, that the excess be removed, thus obviating the possibility of toxic absorption. With a short period of rest the patient is put upon the table prepared for suspension.

Some form of suction apparatus is an absolute necessity to care for the secretions from the salivary glands, and fluid from the esophagus, also to remove those blood clots which collect upon the posterior tracheal wall as far down as the bifurcation, for picking up fragments of tissue that may be loosened from the grip of the retaining forceps, and to render the operative field clear, reducing the traumatism of sponging very materially—a very important factor in laryngeal work.

The patient ready, we proceed as follows, with all parts except the face covered with sterile goods: The gallows is fixed to the platform of the table top, usually from four to six inches beyond the hinged portion, or forward of the patient's shoulders, so that its traveling distance in the horizontal is markedly increased. The coarse vertical adjustment is lifted to its limit and the clamps securely fastened. All parts are seen to be tight and solid, that no accident or slip may occur from this source.

The patient is so placed upon the table that his shoulders will project about two inches beyond the hinged joint. This will allow for the hyperextension of the head and keep movement of the occiput from being blocked against the table top.

An assistant standing to the right of the table or crane side, facing the head, holds the head firmly in both hands, being sure at all times to keep the head straight with the body. The hinged portion is dropped and the head is extended somewhat, as is shown in Figure 1.

I usually now fold a piece of gauze over the teeth of the lower jaw and crowd the tongue back into the mouth, to avoid pinching or lacerating the tongue by its pressure on the teeth —an accident which has occurred several times.

A suitable tongue spatula and tooth plate having been previously selected and adjusted, the mouth is opened, the instrument closed, the spatula is passed back over the tongue to reach the postpharyngeal wall. The worm gear joint on the shaft of the instrument is adjusted to an angle to lift the hook end away for the assistant's arm, as is shown in Figure 2. The spatula will now assume the relative position as is shown in Figure 3.

The head is still further extended and held in the middle line, the tongue in the middle line, the tip of the spatula following along the posterior pharyngeal wall, the tooth plate being placed behind the incisor teeth of the upper jaw, and the hook adjusted into one of the notches of the traveling crane, as is shown in Figure 4.

A firm hold is maintained on the instrument at all times, that it does not slip from side to side, and all movements are kept in full view at all times.

Now the tooth plate represents the fixed point of the instrument, the tip of the tongue spatula, the movable point, and by turning the screw that moves the ring to which is attached the tooth plate, we succeed in driving the tip of the spatula further into the mouth along the hypopharyngeal wall under the epiglottis, which procedure I have nicknamed "jacking of the epiglottis." The patient's head now hangs free, but a firm hold is maintained upon the instrument, that no movement may displace it. I call your attention to the plane and position of the spatula, as is shown in Figure 5.

The tip of the spatula is shown in Figure 6.

One can usually see now the pyriform sinuses, the opening of the esophagus, and the esophageal surface of the arytenoids. (Figure 7.)

The teeth are here examined, and if the lips and tongue are not pinched, the patient's general condition is noted for comfort and safety.

The worm gear joint on the shaft is now straightened, which will have the effect of lifting the tip of the spatula toward the epiglottis, and of swinging the head into extension, but I do not carry this movement as far as Killian, for I do not have the transverse portion of the crane to overlay the tip of the tongue spatula, as Killian suggests. (Figure 8.)

The horizontal movement of the crane is used to assist in tilting the tip of the spatula upward, that I may still further straighten the road to the larynx and gain a wider field of view, as is shown in Figure 9.

At this moment usually all is in fine view but the anterior quarter of the larynx—tonsil pillars, palate, uvula, hypopharyngeal wall, pyriform sinuses, mouth of the esophagus, arytenoids, posterior three-fourths of the vocal cords, trachea to bifurcation, etc. To gain the anterior commissure, the vertical movement of the crane is utilized to swing the head free of all support, and in some instances even the shoulders are lifted by this movement. Then the crane is moved horizontally and the epiglottis jacked a little more, until finally we see the anterior commissure of the larynx standing well before us, as is represented by Figures 10, 11, 12.

I must call your attention to the marked differences in the two positions, as pictured by Killian and myself. In the former instance, the crane occupies a position far below the patient's head, the transverse portion of the crane must overlay the tip of the tongue spatula, which will bring the spatula in a perfectly straight line. Since we know, as proven by Jackson and others, and as is shown very nicely by Iglauer in a radiograph in the *Laryngoscope* (June, 1913), that the larynx and trachea do not proceed in a perfectly straight line into the chest, but go downward and backward, a perfectly straight line view will not show the anterior commissure in those cases where marked muscle development is present. While in my position, by gaining marked tilting of the tip of the spatula, this muscular tension is overcome and you can acquire a view of the anterior commissure in those cases not otherwise possible.

By referring to Figure 13, Killian's position, the relation of crane to head and tip of spatula will be noted, also the spatula is seen to occupy a straight position in the mouth, which will not show the anterior commissure. In this case, under suspension (a cadaver), the position of crane hook and spatula, as shown in Figure 14, is the one assumed by me in most instances. The spatula tilted up at its tip, pressing the epiglottis forward to the hyoid bone, as can be seen from the angle of frame of hook, also the straight line assumed by the neck, which I believe is necessary to see the anterior commissure and which is absolutely necessary in adults and rigid cases. As the case is suspended, the anterior commissure can be seen perfectly well, and in this position it is possible to do any of the intralaryngeal operations.

In Figure 15 I have attempted to photograph the view of the larynx as is shown in Figure 14, a small tungsten lamp being placed inside of the mouth and the picture taken with the camera that I used in the other illustrations. While the photograph is not quite clear enough to study the anatomy of the part, the cords, both false and true, and the anterior commissure can be recognized. I call your attention to the view obtained and the advantages of this instrument over the others now in use: First, the broad ring to which is attached the mouth gag, brings the pressure in the middle line and balances the instrument in place, at the same time removing every part of the instrument from obstructing the view of the mouth cavity and parts beyond. No screw heads either to the side or in front attract the attention of the eye or furnish a projection upon which instruments, gauze, etc., may catch during operative work. Again, the ability to open the mouth wide and the large lateral measurement, will permit of the free use of tubes, both bronchoscopic and esophagoscopic, in conjunction with this instrument.

The use of multiple and adjustable tooth plates which are here possible will give additional service in procuring the proper view, besides being adaptable to various mouths, teeth, etc.

In cases where the epiglottis is made up of very thin cartilage, the structure falls back against the postpharyngeal wall, and when caught up by the spatula will bend backward and form a roll that will obstruct the view of the anterior commissure, or when that organ persists in slipping from the hold of the tongue spatula and falls like a curtain over the view, or, as occurs sometimes, it rolls under the spatula and folds with its free edge towards the larynx. When it is kinked near the cushion, I have found that driving the epiglottis straight with two bridle sutures placed on either side of the middle line, as is shown in Figure 17, will straighten out all these irregularities. The spatula is introduced along the base of the tongue until the epiglottis is seen and held in this position while the two bridle stitches are placed, then the spatula is removed, and while the tongue is crowded into the mouth, tension is made upon the sutures, drawing the epiglottis straight. The spatula is then introduced as described, and the sutures will lie then between the tongue surface and spatula. If the pressure here is not sufficient to hold them in place, I tie them to the frame of the instrument.

In introducing the spatula, if the tongue should slip to one side and heavy extension is made, one is liable to tear the pillars of the fauces on the side of greatest tension. If force is used in sliding the spatula along the postpharyngeal wall, a bruise or laceration may be produced in this region. The tongue should be kept in the center.

In the mouths of old people, where the teeth are brittle or carious or uneven, one may have trouble in finding a suitable base for the tooth plate to rest against. My adjustable tooth plates will correct this, or some form of dental mould can be made to distribute the pressure along the upper jaw. A rubber tube split longitudinally and slipped over the teeth will keep them from harm; likewise a small roll of gauze placed between the teeth and the tooth plate will not slip, and will relieve the pressure of the metal against the teeth.

By following the advice to pull the tongue out of the mouth at the beginning of the introduction of the spatula I have bruised it many times. This can be overcome by crowding the tongue back into the mouth and placing a roll of gauze between the under surface of the tongue and the inner aspect of the teeth of the lower jaw. I do not pull the tongue forward at all now—it finds its way forward too many times. Hematomata and lacerations may develop at the tip, which so far have amounted to nothing except for the soreness and inconvenience. They usually subside within ten days.

Before removing the instrument from the mouth the secretions accumulated in the cavity of the hard palate and in the nasopharynx should be removed by the suction apparatus. If not, when the head is replaced on the table top the fluid will flow back into the anesthetized larynx and may upset the patient considerably by choking, etc.

A part of the work done under or by the aid of the suspension laryngoscope can also be done by either the indirect method with mirror, etc., or by the aid of one of the direct spatula or tubes now in use. To sum up in one word the value of suspension laryngoscopy, I should say it induces accuracy. It is quite true that pedunculated tumors of the vocal cords can, have been and are being removed by the mirror and forceps, but the procedure is a tearing one every time. This cannot be compared with the accuracy that accompanies the procedure of picking up the tumor mass with a pair of forceps and dissecting it from its base with a knife or scissors.

Papillomata have been removed time and again through a straight tube or spatula, but they always recur, and one is tired long before the larynx is clear, and the papilloma have recurred almost before the instruments are clean. On the other hand, I report fourteen cases removed by dissection, each in one sitting, and none has recurred to this time. St. Clair Thompson reported his brilliant result of the removal of an intrinsic malignant growth from the larynx. The operation was a "tearing" one, as described by him. I have four to report, of removal by dissection wide from the growth, with no recurrence up to this time—the oldest being nearly two years.

Cauterization of the larynx for tuberculosis that cannot be done except by the most skilled, can be done far more accurately and with less pain by one not so skilled, aided by suspension.

I have destroyed two rather large squamous celled epithelioma involving the hypopharyngeal wall near the mouth of the esophagus, by the "Percy" method of cautery. The cases are now free from return and the surfaces cicatrized. This would have been perfectly impossible without the aid of suspension.

Intubations can be done, foreign bodies removed, abscesses opened and radium accurately placed and maintained. Parts can be inspected that have never before been seen—namely, the under surface of the vocal cords and the ventricles of the larynx—by the use of my "tilting mirror." Finally, stitches can be placed in any part under view, and all operative work can be carried on in a thoroughly surgical and scientific manner, as is practiced upon the skin surface. The work is at all times in perfectly full view of the operator, and he is free to be as accurate as possible in every move, sitting comfortably with both hands, not even a tired muscle strained or assistant to worry about.

In reviewing my work with the suspension laryngoscope and the dissecting instruments, I am struck forcibly by three facts: 1. The ease of acquiring the technic—in fact, the technic is acquired during hospital life and under the early instruction in general surgery. 2. The absolute accuracy and deliberation with which one works, having both time to think and to act without the fear of losing the field, as occurs in the indirect and direct methods. 3. The very mild amount of reaction that occurs after what would seem the most unwarranted abuse of such a structure as the larynx.

In proceeding with the surgery of intrinsic growths, preparation to work may be made in this way: The patient is suspended and is perfectly quiet and comfortable, or as nearly so as possible, under either local or general anesthesia. The larynx and anterior commissure of the vocal cords are in full view, all parts are fixed and the field well lighted either by head mirror, Klar, Kirstein attachable or detachable electric lights. The larynx is tested with a cotton mop of ten per cent cocain, and if slight reflex occurs, the mucous membrane of the larynx only is painted until all local sensation is gone. In some cases it will be possible to inject cocain or novocain with my extension syringe into the tissues of the larynx for anesthesia. Once anesthetized, the surface is painted or scrubbed gently with argyrol solution, twenty per cent, or pure alcohol, that it be rendered as nearly clean surgically as possible.

Vocal nodules are picked up carefully and examined to be sure that nothing but nodule is in the forceps, when the small tumor is carefully cut from its base.

Pedunculated tumors are treated likewise, their point of attachment being sought. It is striking how many grow from the loose area just under the vocal cord, instead of from the vocal cord itself, as appears upon indirect examination. Here the cord is lifted up or turned back so that the attachment can be seen and the tumor removed with its base included, the raw surface remaining being either covered with the compound tincture of benzoin as a dressing, or stitched, as was done in one case by me, where the raw surface was unusually large.

In papilloma I have found my greatest pleasure in the fact of being able to remove them completely at one sitting, without recurrence. Some of my cases are over a year old and have not recurred as yet, and are still under observation.

Inasmuch as papillomata of the larynx differ in no way from those on the skin or other mucous membrane surfaces, why should they recur so persistently in this locality as against all others? It would seem the only answer is, incomplete removal. Why should this be? Because we have never before been able to operate with anything but punching or pinching forceps, neither of which will remove completely a papilloma from its base.

I have had fourteen cases with no recurrence in any instance. The first case, operated on in July, 1913, is still free from papilloma, has a very good voice, and is perfectly well. I referred to him as "Buster" in the article before the American Laryngological, Rhinological and Otological Society, June 19, 1914. The case referred to in the same article as "D. B." has an interesting history. After the removal by dissection in August, 1913, she returned home, and remained well until February, 1915, when she returned again to the clinic with some hoarseness. I was sure, upon hearing her voice, that now I must tabulate my first failure, when upon examination I found that there was a small papilloma developed beneath each vocal cord. I remembered that no papilloma was found beneath the vocal cord at the operation, and in looking into the larynx the parts above the cords were perfectly free, while just beneath the cord these two small weak looking masses appeared. I removed them by dissection, and she has since had no return of any kind.

For papilloma I proceed by picking up the growth with a hook or mouse tooth forceps, planted as near the base as possible, and dissect cleanly well beneath the growth, taking care not to injure muscle tissue, so as not to limit the function, if possible. After dissecting clean all the involved surface, the base is scraped thoroughly with a spoon curette and the raw surface left swabbed with pure alcohol.

I have never given arsenic or used radium or any other agent to retard the growth; I depended on my dissection, as I was anxious to be certain that the lack of return was to do nothing else but clean dissection.

I have removed four malignant intrinsic growths of the larynx, one spindle cell, the other squamous cell epithelioma. My first case, referred to at Atlantic City meeting as "Mr. B.," is still free from any sign of return, is hard at work and enjoying good health.

"Joe C.," colored, was operated on by my method in June, 1914, tumor occupying the anterior half of the right vocal cord, extending to the commissure. He is a professional singer in negro vaudeville, and weighs about one hundred and ninety-seven pounds. With suspension under local anesthesia I removed by dissection down to the cartilage the anterior third of the left vocal cord, the right cord back to its vocal process, and the tissue for about one-half inch on the cricord below the vocal cords. His recovery was very rapid and complete, and he now has a moderately fair voice (not singing) and is so far without recurrence.

"Mr. H.," operated on in January, 1915, and "Mr. T.," in March, are too recent, except to say they have both healed nicely and are at this minute healthy and well (April 20, 1915).

The cases of malignancy of the larynx suitable for this procedure must be carefully selected. The tumor must be purely intrinsic. If the joint has been fixed for some time and the history that of a fairly rapid growth, I would hesitate to use the method. If the arytenoid is edematous and a progression here is feared, if it would seem to extend subglotically to the cricothyroid membrane, or if cervical glands are palpable, then I would not select this method.

All four cases were practically well on the fourth day after the operation, there being no temperature or any symptoms that gave the least amount of concern. In none has there been the slightest disposition to edema or stenosis at any time —in fact, I am still surprised at the practical absence of inflammatory reaction. I believe the possibilities of recurrence are lessened here, because of the fairly sterile field under which healing takes place, with no external wound or separation of the thyroid or cricoid cartilages. It has been through this pathway that my thyrotomy cases have recurred. I have not had a sufficient number, nor sufficient time to formulate anything that would be more than a mere personal thought.

I have destroyed by the actual cautery two squamous celled cancers growing from the mouth of the esophagus, both tumors occurring in men of about seventy years of age, one a negro, the other a white man. In one the tumor involved the posterior surface of the arytenoid, and was beginning to go down the esophagus. Under suspension, with the mouth wide open and a current of air playing in the mouth and the suction carrying off the smoke, and assistant's hand on the surface of the neck guarding the temperature through the skin, I proceeded to burn through the growth in all directions, after the method of Percy, being careful that the temperature was not sufficient to char the tissues, but enough to turn them to ashy white. The sitting required about fifty-five minutes. The patients went through their convalescence nicely and are still free from recurrence. Both are still under observation and will furnish material for a later report. These cases were done in the early part of December, 1914. I think this is the first reported instance of this method under suspension, and in dealing with tumors this way. In the case of a pedunculated epithelioma growing from the postpharyngeal wall, just above the arytenoid cartilage in an old negro man of about sixty-eight years, I dissected the tumor free from its attachment well below its base. There was left an open surface of one and one-quarter inches long and about half an inch wide, which I closed nicely by fine catgut sutures, using the smallest Lane needle and No. 0 plain catgut. This was done in November, and the patient is still well.

The immobility of the larynx under suspension renders the operation of cauterization of tuberculous ulcerations accurate and certain, without danger of destroying healthy tissue. I have operated on four cases of this type with uniform good results, relieving pain, adding to the comfort and prolonging the life of the patients.

I have removed a peanut from the bronchus of a baby fourteen months old, under suspension, with my speculum for separating the vocal cords. I removed a few masses from the trachea, and a large part of the kernel impacted in the right bronchus. It required no anesthetic nor a tube for this work.

Suspension was used in the removal of an open safety pin from the esophagus of an eleven-months-old child. The clasp, imbedded point upwards behind the cricoid cartilage, was caught with one pair of the baby forceps, the spring end with another, and the pin rotated so as to lie with its point downward towards the stomach, changing hold the forceps from the clasp end, now caught the point side of the shank and bent it in so as not to catch the side wall. The spring end was then brought up and out, with the point guided by the other forceps so as not to injure the wall of the esophagus. The child recovered nicely.

A young boy who received a blow on side of the neck suffered a fracture of the thyroid cartilage. I saw him some weeks after, with aphonia, dyspnea and a palpable fracture. Under suspension I was able to see a large granulation protruding into the larynx from the side of the fracture. Both cords were movable, but very red. I removed the granulation and placed an intubation tube in the larynx to fix the fractured plate. This was worn for about six days. Upon its removal the crepitus previously felt in the cartilage was gone and he breathed well.

Laryngology was born when Garcia discovered the laryngoscope, it bowed slowly to Kirstein when he saw directly into the larynx with his spatula, and it is now bowing again to our master of laryngology, Prof. Gustave Killian, when we are able to sit and view the larynx under suspension with both hands free to work.

While we all realize the infancy of the procedure, and are groping widely for its advantages and limitations, we cannot but think that the old must give way to the new method of attack, and I am certain that we will begin to change our opinions, in proportion to the field of view and the possibility of its accomplishments.

I submit to you this, "A review of my efforts to place the apparatus, its principles and accomplishments, upon a firm foundation, a procedure established, true, but requiring much work yet to give it its proper status in our scientific attainment."

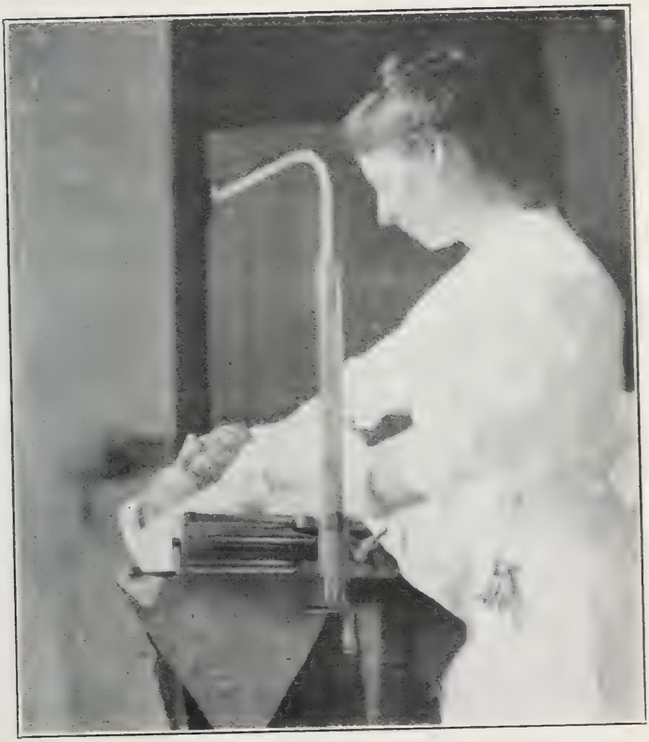


FIGURE 1.

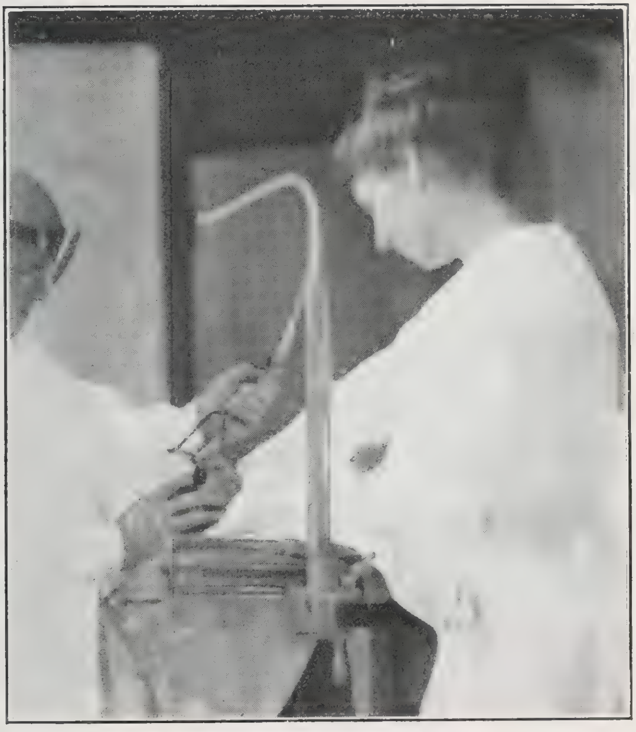


FIGURE 2.

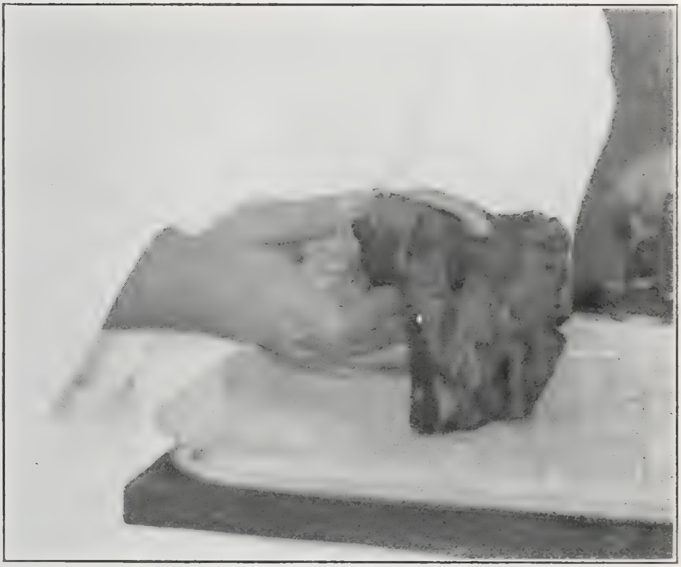
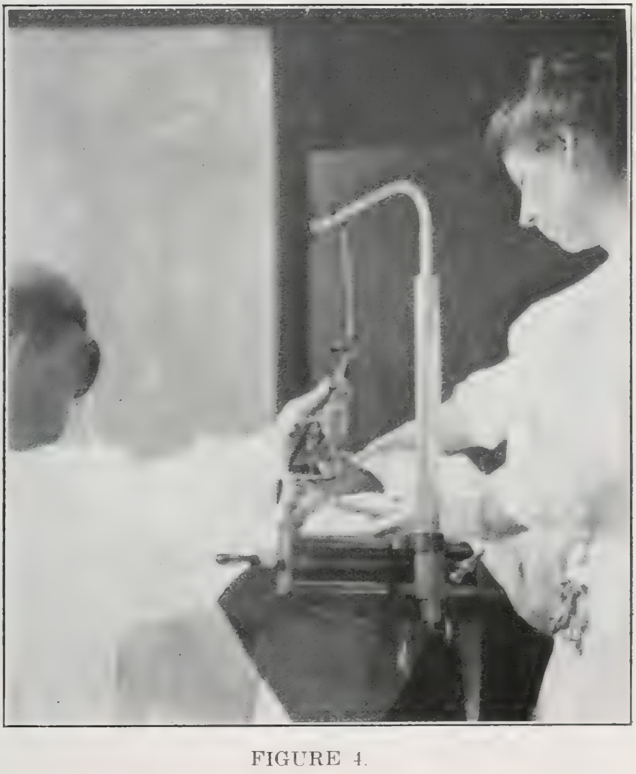


FIGURE 3.



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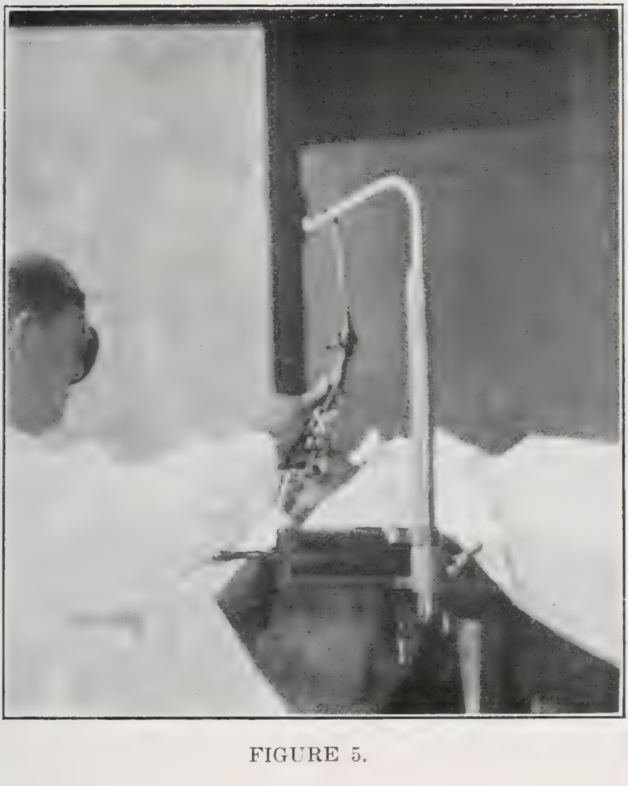
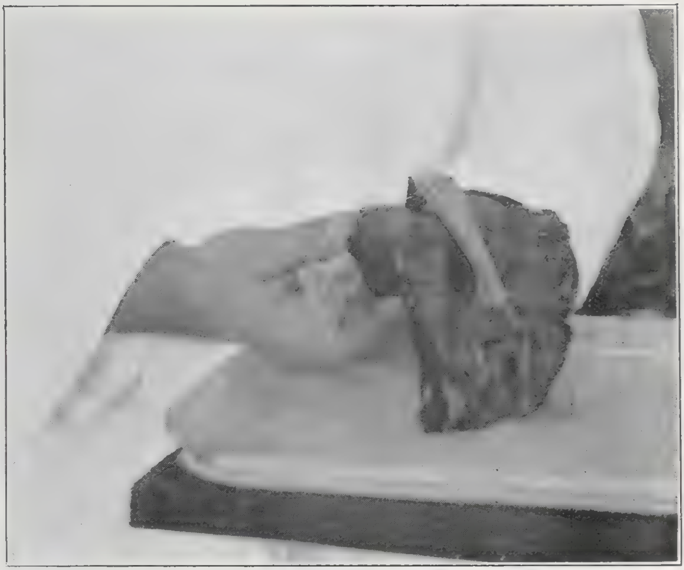


FIGURE 5.



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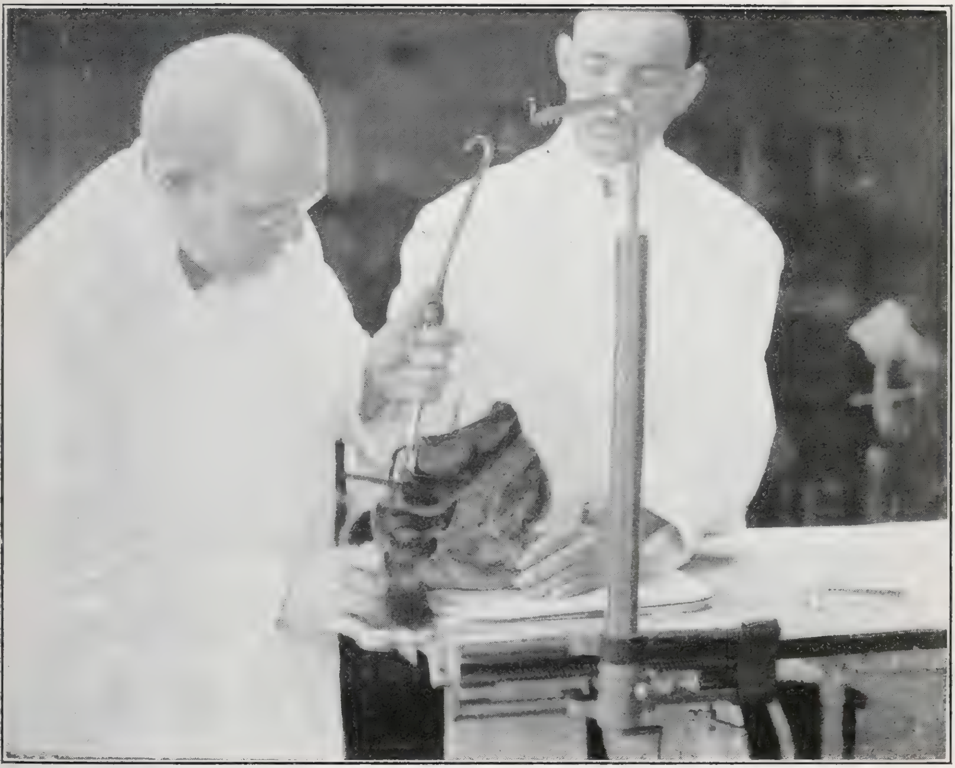

FIGURE 7.

FIGURE 8.

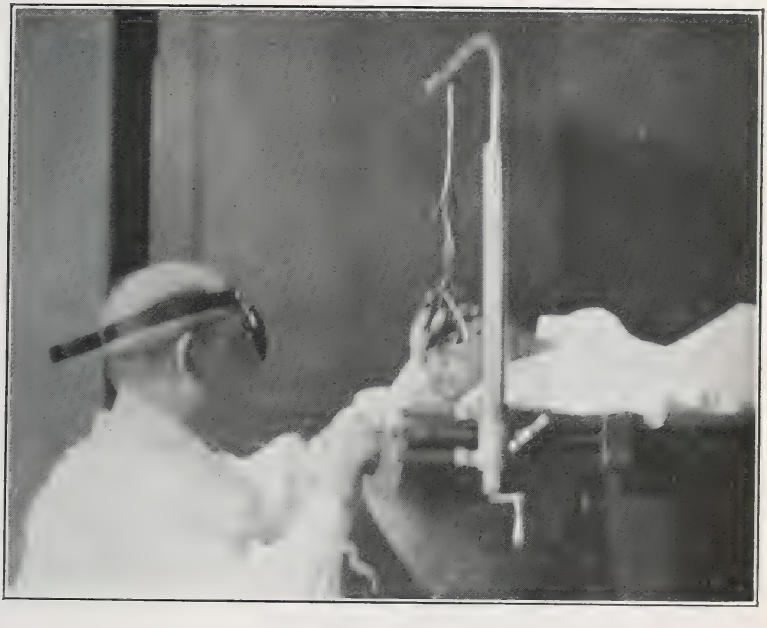

FIGURE 9.

FIGURE 10.

FIGURE 11.

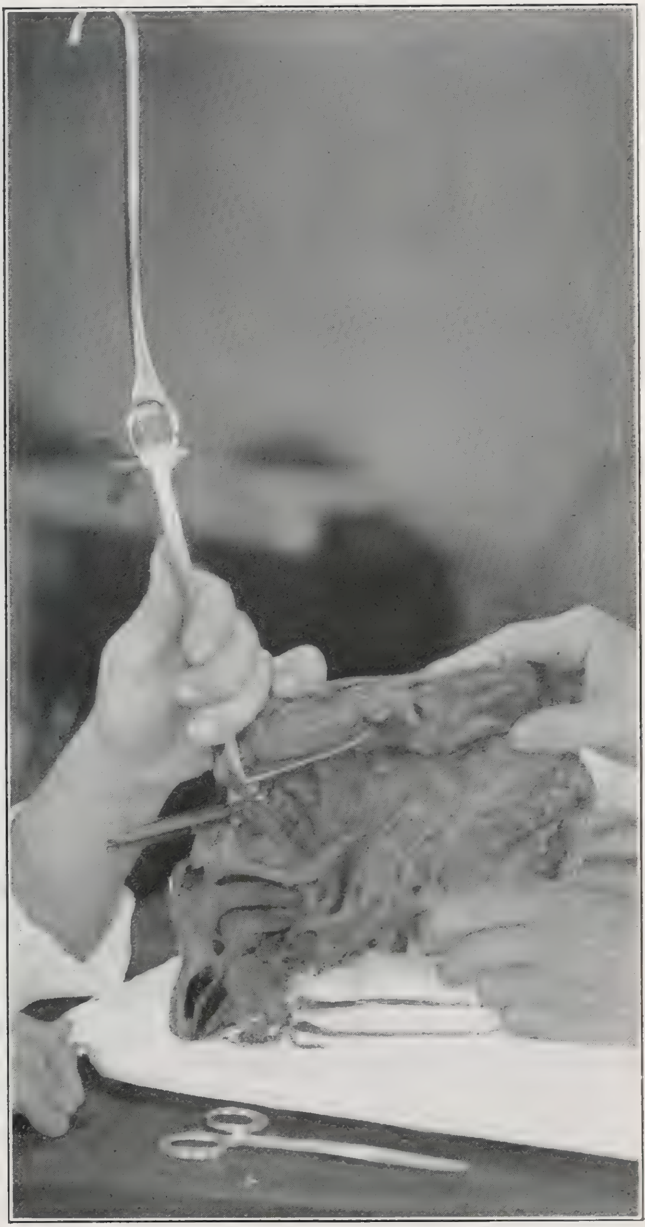

FIGURE 12.

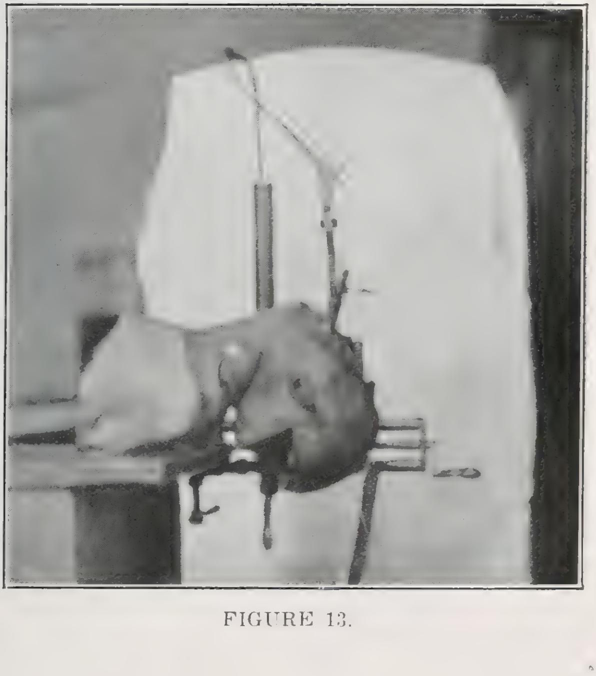

FIGURE 13.

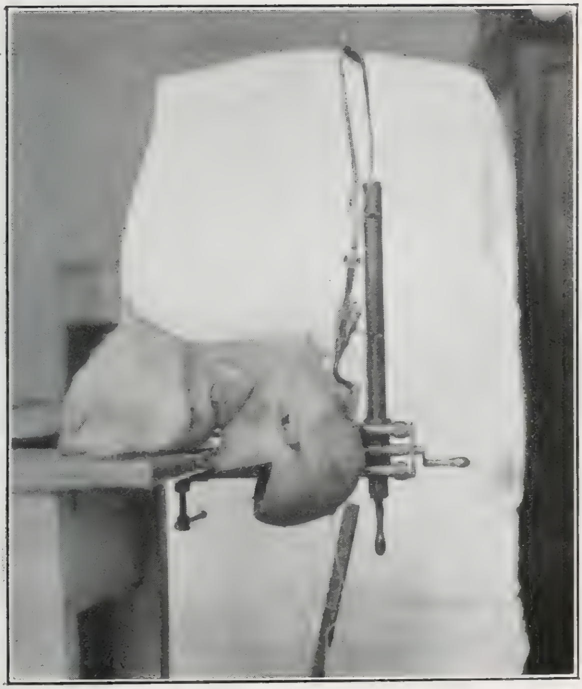

FIGURE 14.

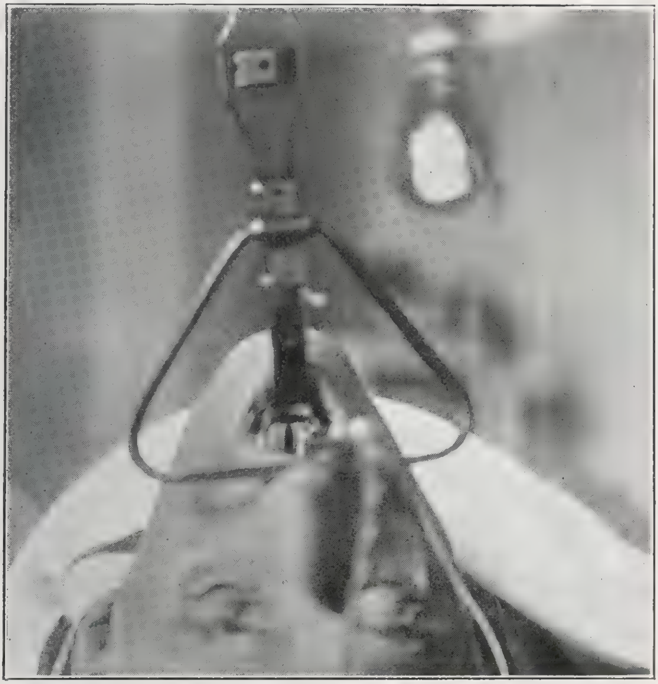

FIGURE 15.

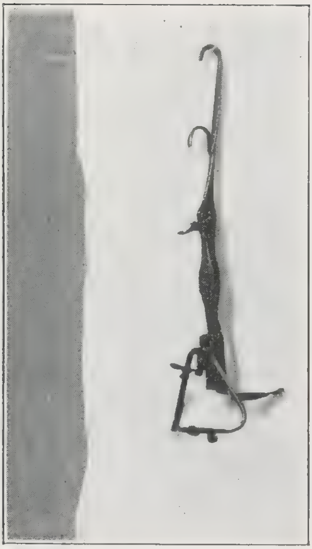

FIGURE 16.

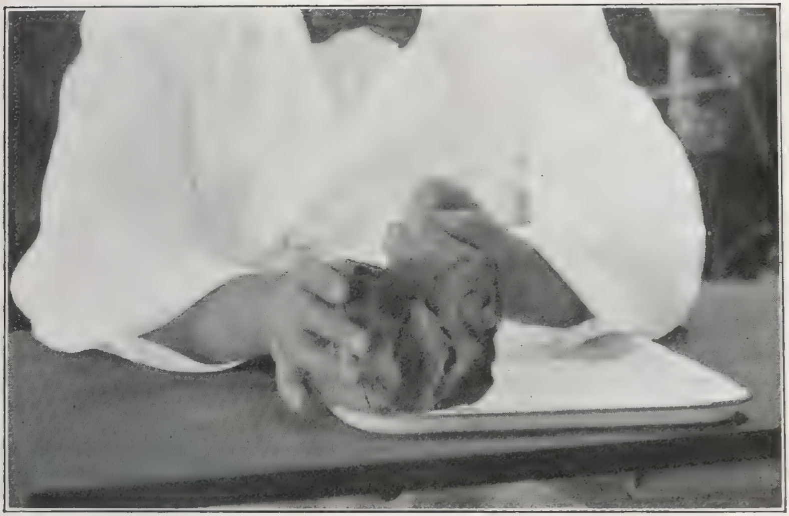

FIGURE 17.

XXIX.

FOCAL INFECTION IN THE ETIOLOGY OF LABYRINTH DISEASE.*

By George E. Shambaugh, M. D.,

Chicago.

In recent years a great deal has been done to clear up the various problems in the physiology of the internal ear. With this has come a better understanding of the symptoms arising from disturbance in function when the labyrinth is invaded by disease. We experience, as a rule, little difficulty in diagnosing cases of labyrinth disturbance and of reaching a more or less satisfactory conclusion regarding the probable nature of the pathologic changes which have taken place. The diseases of the labyrinth which we readily recognize include labyrinth involvement from suppurative disease of the middle ear or from meningitis; injury to the labyrinth, either through a fracture of the base of the skull or when operating on the middle ear; syphilis of the internal ear; otosclerosis with labyrinth involvement; degeneration in the labyrinth following long standing obstructive middle ear deafness, the degeneration in the labyrinth occasionally following the infectious fevers, as well as occupational deafness.

There remains a group of cases in which the labyrinth disease occurs in patients who have had no middle ear trouble and no general disease to account for the labyrinth involvement. In some of these cases the symptoms arise from disturbance limited to the cochlea; in others the symptoms are from involvement of the vestibular apparatus alone, while in many of the cases there is a disturbance of the whole labyrinth. The symptoms arising from the involvement of the cochlea are nerve deafness and usually tinnitus aurium. The deafness may be very insidious in its progress, in which case the tinnitus may be very slight or even quite absent. In many of the cases the progress of the deafness takes place chiefly by acute exacerbations which occur as distinct apoplectiform attacks, and in these cases the tinnitus is always more marked immediately following each separate attack. In a few cases the first attack destroys permanently the function of hearing. The accompanying tinnitus aurium in such cases gradually diminishes, but often lasts for a period of years before entirely disappearing.

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*Read before the American Otological Society at its Forty-eighth Annual Meeting, at Niagara Falls, June 4, 1915.

The symptoms arising from disturbance of the vestibular part of the labyrinth are those of disturbed equilibrium, the result of the imbalance occasioned by the partial or complete suppression of tonus from one labyrinth. This disturbance is always temporary and occurs as the sequel of an acute exacerbation of the vestibular involvement. In cases where the vestibular involvement is very insidious in its development the symptoms of disturbed equilibrium may be entirely absent.

The clinical picture from this group of labyrinth cases differs, therefore, very widely, depending upon whether the trouble is insidious in its development or whether it is punctuated by distinct apoplectiform attacks, and upon whether the disease involves both parts of the labyrinth or is restricted to either the cochlea or the vestibule. When the disease is associated with acute exacerbations involving the whole labyrinth, it gives rise to the group of symptoms which are commonly known as the Meniere symptom complex—that is, deafness, tinnitus and vertigo. When the disease involves both parts of the labyrinth, but progresses without acute exacerbations, the only symptoms are deafness and tinnitus.

It is in regard to the etiology of this group of labyrinth cases that I wish to call your attention. Meniere was the first to associate the attacks of vertigo, when combined with deafness and tinnitus, with disease of the internal ear. He believed that the disturbance was the result of hemorrhage in the labyrinth. That a hemorrhage into the labyrinth may produce this group of symptoms no one now will deny, but there are no grounds for believing that this is the actual pathologic change which takes place in these cases.

Some of these cases are called essential neuritis, others are designated as chronic progressive labyrinthine deafness, but there is nothing in either of these terms to suggest the cause of the changes going on in the internal ear. When we seek to find analogies for these internal ear degenerations among diseased conditions found elsewhere in the body, we recognize at once the similarity between the phenomena observed in these labyrinth cases and the chronic degenerations which occur as the result of focal infection. Recent investigations have shown that chronic arthritis and neuritis, chronic cardiovascular degenerations and chronic nephritis are the result frequently of chronic latent foci of infection, the presence of which is often not suspected by the patient, since they often produce very slight or no local symptoms.

In all of these systemic diseases there is the chronic progressive character, punctuated, as a rule, from time to time by acute exacerbations, which are accounted for by a fresh shower of bacteria discharged from time to time into the circulation from the infected focus. These bacterial emboli lodge now in one part, now in another, through some as yet unknown predilection. Sometimes only one part, as a single joint, is involved; in other cases several structures are simultaneously affected.

To account for the phenomena observed in many of these cases of internal ear disease as the result of focal infection we have only to assume that the endings of the eighth nerve may be the structure peculiarly susceptible to the bacteria liberated from the infected focus. Each fresh shower of bacteria liberated into the circulation produces a sudden depression of function, either in the cochlear or vestibular nerve endings, separately or in both simultaneously. With each attack the patient experiences a defect in the hearing, associated with tinnitus aurium, when the cochlea alone is involved, or there is a disturbance of equilibrium with vertigo resulting from the one-sided suppression of labyrinth tonus when the vestibular apparatus is involved. When both the cochlear and vestibular endings are simultaneously affected, we have as a result the complete picture of the Meniere symptom complex—that is, deafness and tinnitus with vertigo.

A single attack may occasionally be severe enough to produce a total permanent suppression of function in the affected labyrinth. Here, in addition to the total deafness in the affected ear, there will be a severe tinnitus, which, diminishing gradually after the attack, may still require years before it entirely disappears. The vertigo occasioned by the sudden complete unilateral suppression of labyrinth tonus will be very marked, but will also gradually disappear, rarely lasting more than a few weeks or months. In such cases, where the single attack causes a complete destruction of function in the affected labyrinth, there will, of course, be no subsequent attacks, unless the other ear should later become involved.

In most of the cases there is but a partial suppression of function resulting from a single attack. Here the deafness, as well as the tinnitus, are most marked immediately following the attack, but neither disappears entirely, as a rule, even after a long period. The vertigo usually disappears rather promptly after a few days or weeks. In these cases of partial suppression of labyrinth function there will very likely be subsequent attacks, provided the focus of infection persists. In some cases the attacks with the Meniere symptom complex persist at irregular intervals over several years, associated always with an increasing loss of function. The attacks may cease only after the function of the affected labyrinth has been completely destroyed.

With this conception that the internal ear may be the target for a systemic infection of focal origin, we have at once a plausible explanation not alone for the chronic progressive character of the degeneration going on in the labyrinth, but also for the apoplectiform attacks with which these degenerative changes are so prone to be punctuated.

The possibility that some of these labyrinth cases of unknown origin may be caused by focal infection cannot be denied. It behooves us, therefore, when examining these labyrinth cases of obscure origin, to make a careful search for foci of infection, just as we have learned to do in cases of rheumatism and allied conditions.

The focus for these systemic infections is usually found in the faucial tonsils or in abscesses around the teeth. When the tonsils contain the foci producing the systemic infection, there is very often a history of recurring attacks of acute tonsillitis. In some of the cases the patient will admit having recurring attacks of "sore throat," but denies ever having had attacks of tonsillitis. As a matter of fact, the recurring attacks of sore throat are usually mild attacks of tonsillitis, as can be readily determined by examining the pharynx during one of these attacks. It is, however, not uncommon to obtain no history of sore throat, and yet a careful examination will disclose unmistakable evidence in the faucial tonsil of chronic infection. In some cases this evidence is the presence of pus, which can be expressed from the tonsil. In others the congested appearance of the tonsil indicates clearly the presence of an infection. Such tonsils may be enlarged, but often they are distinctly shrunken and smaller even than the normal tonsil.

When the focus of infection is located about the teeth, it not infrequently requires the use of the radiogram to discover the abscess.

Since this relation between foci of infection and disease of the internal ear suggested itself to me several years ago, I have had the opportunity of examining a large number of these cases of internal ear disease of obscure origin, and have already collected a number where the presence of such chronic foci of infection could be demonstrated, which our experience has shown to be capable of producing systemic infection. I will give briefly the history of three typical cases.

Case 1.—Mr. S., aged forty-four years, seen in April, 1912, because of a sore throat. Faucial tonsils had been operated on five years before. Large stubs had been left on both sides. Tonsil on left side congested. On pressure pus could be expressed. June, 1914, he consulted me because of a soreness in the left tonsil which had persisted after an acute tonsillitis a few weeks before. Pus expressed from the left tonsil showed pure culture of streptococcus viridens. Patient had an acute swollen joint in the forefinger of right hand. Ten days later had an attack of vertigo with nausea, which confined him to the house for several days, slight tinnitus aurium, but no defect in the hearing. Membrana tympani normal and no evidence of middle ear disease. Patient seen again in October, 1914. Had developed rheumatic soreness in several joints, including hands, neck and knees. Pus still found in left tonsil. Tonsil stubs enucleated November 7th. Pure culture streptococcus viridens grown from the tonsil. Following the operation the rheumatism disappeared for two months, when he began to have recurrence. The Roentgenogram disclosed a tooth abscess. The tooth was removed. Pus from the abscess gave pure culture of the streptococcus viridens. The rheumatism disappeared promptly after the removal of the focus of infection under the tooth.

Case 2.—Mrs. L., aged fifty-three years, consulted me October, 1911, because of defective hearing. The trouble had developed suddenly three years previous in association with an acute peritonsillar abscess on the right side. She had experienced a sudden attack of deafness and tinnitus in the right ear, associated with vertigo and sensation of objects moving before the eyes. Examination showed drum membranes normal, and the functional tests disclosed complete deafness in the right ear with slight loss of hearing in the left.

Case 3.—Mrs. M., aged sixty-eight years, consulted me May, 1914, because of a very severe attack of the Meniere symptom complex, during which the vomiting had lasted for twenty-four hours. History of similar but lighter attacks for several years. Has been somewhat hard of hearing for a number of years. Has had chronic articular and muscular rheumatism for several years. History of recurring sore throat. Tonsils were small, but presented the congested appearance characteristic of tonsils the seat of chronic infection. Pus was expressed from the right tonsil. Both ears hard of hearing. Whisper not heard in left; heard in right about two feet; deafness of the labyrinth type.

XXX.

INFECTION OF THE EAR WITH VINCENT'S MICRO-ORGANISMS—REPORT OF SIXTEEN CASES.*

By J. A. Mulholland, M. D.,

New York City.

At a meeting of the nose and throat section in December, 1911, I had the privilege of reporting upon the aspects of this disease as observed in the wards of the New York Foundling Hospital. Twenty-four cases were then collected and certain observations with regard to the disease recorded. These were (1) the fact of its occurrence in debilitated children, (2) its apparent contagiousness, (3) its amenability to local treatment, and (4) its good prognosis.

Since then a number of articles have appeared which support the above observations and certain new data have been collected which will undoubtedly enable us to grapple more effectively with this disease. In looking over the literature, however, one is struck by the scarcity of case reports of this affection as observed in the ear. Only two papers and one textbook give it mention. The group of sixteen cases that I now present are, therefore, of considerable, if not unique, interest. Of these sixteen cases, thirteen were confined to the middle ear and meatus, and three had mastoiditis; two of the latter were considered inoperable and died from meningitis; both had complete facial paralysis. One case was operated upon and recovered. The two fatal cases were autopsied. On autopsy it was found that the whole middle ear and mastoid process were necrosed, nature having performed a complete radical operation. The lateral sinus and the dura of the middle fossa were extensively exposed.

It is worthy of note that these cases begin insidiously, without rise of temperature or complaint of pain, attention being called to the condition by the presence of discharge at the meatus. The history in most instances was that of a chronic running ear lasting several months or years; diseased teeth, gums and tonsils were usually present, and the general physical condition of the children below par. On examination there is usually marked excoriation of the external auditory meatus and a profuse discharge of thick greenish pus having a foul and characteristic odor. The walls of the canal are covered with a dirty grayish membrane which, when removed, leaves a bleeding surface. The appearance of the drum membrane varies with the intensity of the inflammation and the stage of the disease. Perforations vary in size from a pin point to complete destruction, and in the severe cases the probe demonstrated bare bone in the middle ear and attic.

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*Read before the New York Academy of Medicine, Section on Otology, March 12, 1915.

The mastoid cases showed considerable swelling and edema about the auricle, resembling, but rather more intense, that usually seen in subperiosteal abscess. On opening the mastoid the cortex was found to have almost completely disappeared, and the underlying cavity was filled with a spongy putrid mass containing some small sequestra of bone. The internal table was also absorbed, exposing the dura, and in the fatal cases the skin and subcutaneous tissue had become gangrenous. The appearance of the interior of the mastoid agrees perfectly with the description given by Yates of his case, and would appear to be typical of this infection.

The belief voiced in my previous report that the affection is at least mildly contagious is borne out by these later observations, nine of the sixteen cases coming from one ward, five from another, and two from a third.

The treatment raises several interesting questions which we hope to solve in the near future. The general treatment was symptomatic. Locally, irrigation with a 1/2,000 bichlorid solution at two hour intervals day and night was employed, with one swabbing daily of the external canal with a ten per cent trichloracetic acid solution. In the last four of our cases we dispensed with trichloracetic acid and substituted salvarsan locally, the powder being blown into the canal. Salvarsan was also given intravenously in these four cases, with remarkably satisfactory effects, all of the children recovering in from two days to two weeks.

The question has been raised as to whether salvarsan owes its curative effect to its well known antagonistic action upon this class of parasites, or whether the disease was engrafted on a syphilitic basis. At least one case has been reported in which two Wassermann examinations were negative.

It is also interesting to note that Vincent's organisms are characteristic of noma, and it may be possible hereafter to save a number of these cases by the use of salvarsan, the present mortality being about seventy-five per cent.

Coplin, quoted by Amsden, says that "recent investigators are of the opinion that the various forms of spirochetæ and spirilla found in syphilis, Vincent's angina, and relapsing fever are not bacteria in the true sense of the term, but are animal parasites closely allied with the trypanosomes. If this be true, 'it would seem probable that a therapeutic agent having a curative action on a disease caused by one member of this group might have a similar action on other diseases caused by members of the same family, so to speak; hence, salvarsan has been recommended by Gerber and Rumpel in the treatment of Vincent's angina."

It appears also that our conception of the infection as a symbiosis of two distinct microorganisms will have to be revised and the more logical conclusion adopted that the affection is due to one polymorphous organism. Tunnicliffe finds that there are many intermediate forms between the typical bacillus and spirillum.

I will spare you a review of the literature on Vincent's angina. Several recent writers have summarized our knowledge with regard to the pathology and treatment of this disease, and you are doubtless familiar with these papers. I merely wish to repeat that as far as our observation goes the affection is apparently contagious, and when occurring among children in institutions the cases should be segregated. Salvarsan, whether used locally or intravenously, offers a distinct advance in treatment, and should be tried before operative treatment is instituted upon the ear, unless the mastoid is distinctly involved.

XXXI.

TRANSPLANTATION OF CARTILAGE IN THE CORRECTION OF SEPTAL DEFORMITIES.*

By Fielding O. Lewis, M. D.,

Philadelphia.

The nasal septum, almost unknown and seldom referred to until a comparatively few years ago, now occupies a most exalted position in rhinologic literature. The correction of its deformities, which may in some instances give rise to no symptoms, but in marked cases, with complete bilateral or unilateral nasal obstruction with its consequent mouth breathing, catarrh of the upper air passages, headache, sleeplessness, dry throat, and as an exciting cause of some of the reflex nasal neuroses, has been the means of marked development in the surgery of the nasal septum. After many surgeons had apparently endeavored to correct a deflected septum without sacrificing any mucous membrane, the submucous operation was very thoroughly elaborated by Killian, Freer, Ballenger, and others, until now it is perhaps the most frequently performed operation for the correction of a deviated septum.

The writer's interest was first attracted to the transplantation of cartilage about two years ago, after a submucous operation, during which both sides of the nasal mucous membrane were penetrated, and desiring especially to secure a good result with this patient, a piece of cartilage which had been removed was reintroduced at the point of perforation, with a most pleasing result.

The transplantation or reintroduction of the cartilaginous portion of the septum would seem a simple matter when it is considered that cartilage is a nonvascular structure, and in replacing it after its removal or transplanting it from one patient to another to its normal position and environment, it may naturally be expected to continue its life and function as a part of the nasal structure. While the researches of Tizzoni, Prudden and others have shown that cartilage freed of its perichondrium will in time become absorbed, and in its place fibrous tissue is formed, yet in the experience of the writer and others, the transplanted cartilage has remained for months and even years afterward. Goodale, of Boston, had a good result following the transplantation of cartilage in a nasal deformity. Green, of Boston, reports a case in which the transplantation of a portion of the quadrilateral cartilage from one patient to another was found to be absorbed two years later. In another similar case cited by the same author the cartilage was palpable some months following the operation. Another observer reports a case in which the transplantation of cartilage from a rib to the larynx was successful.

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*Candidate's thesis, presented to the American Laryngological, Rhinological and Otological Society at Chicago, June 15-16, 1915.

INDICATIONS.

The conditions for which the writer has found this procedure useful are: First, when perforation of the septum seems inevitable during the operation of submucous resection. Second, small perforation of the nasal septum regardless of cause. Third, deviation with displacement of the cartilaginous septum, which requires complete removal of the free end of the quadrilateral cartilage, as shown in Figure 1.

Since the operation of submucous resection has been evolved, a great many perforations of the septum have resulted. No matter how much care one may use in the performance of this operation, a sudden motion of the patient's head or a faulty move of the operator may cause his instrument to pierce both sides of the mucous membrane. Personally, I have found this to occur most frequently at a point opposite to the primary incision, for when both sides of the mucous membrane are not torn or injured, a perforation is not likely to occur. The writer has seen perforations of traumatic origin ranging from the size of a pin point to that of almost the complete destruction of the nasal septum, and it is a source of much annoyance to the surgeon as well as to the patient to have the patient return a short time afterward complaining of a whistling sound on respiration, a feeling of dryness in the nose, formation of crusts, and occasionally free epistaxis. To avoid these objectionable symptoms the following method has been successfully used:

In performing a submucous resection a portion of the quadrilateral cartilage which has been found necessary to remove is taken out in as large a piece as possible. This is washed and placed in sterile salt solution, and after the completion of the operation, if it is found that both sides of the mucous membrane have been penetrated or injured by removing pieces of bone, a piece of the cartilage is trimmed by means of scissors to the proper size and introduced between the two surfaces of mucous membrane. Both sides of the nostril are then packed tightly with gauze, being careful to see that the cartilage is in its proper position and the mucous membrane not curled upon itself. In about twelve hours the packing is carefully removed, and the patient is seen daily for a period of four or five days, in order that the position of the cartilage may not be altered and that the surfaces of the mucous membrane are kept clean, for when infection occurs the cartilage is very rapidly destroyed, which is seen to occur in abscess formation of the septum. Therefore, if infection is suspected, free drainage is necessary, and if instituted promptly the life of the cartilage is not altered. The patient should be instructed not to blow his nose, but to snuff the secretions through his mouth during this time. No washes or douches are prescribed. It will be found that the cartilage is easily retained in its position and the membranes heal rapidly, with gratifying results.

This method has been used by the writer in twelve cases, all of which have entirely healed with no signs of perforation remaining. In small perforations of the nasal septum of long standing, as shown in Figures 2 and 3, and especially in the long, narrow, slit-like perforations, which are frequently seen following a submucous resection, with symptoms as described above, the transplantation of cartilage has given excellent results, excepting in those cases where the perforation has been so large that the cartilage has been improperly nourished. In cases which belong to this classification the procedure has been as follows:

If the perforation is the result of the submucous resection, the two surfaces of mucous membrane are divided by means of a modified Freer septal elevator, as shown in Figure 5. The straight end of this instrument is used for separating the mucous membrane at the posterior surface of the perforation, as shown in Figure 6, and the curved end of the same instrument is utilized at the anterior surface of the perforation, as shown in Figure 7. This should be done carefully, as the membranes are with difficulty separated, especially when some time has elapsed after the original operation was performed. A piece of cartilage previously removed from another patient is then inserted between the mucous membranes at the point of perforation, and both nostrils are packed as described above.

If the perforation is caused by a pathologic condition, the same instrument is used as shown in Figure 5 for elevating the mucous membrane around both sides of the perforation to the extent of about one-fourth of an inch, when possible, and a portion of the cartilage is removed between the surfaces of the mucous membrane, as shown in Figures 3 and 4. A piece of cartilage of sufficient size, which has been previously removed from another patient, is then introduced and the nostrils packed as described above.

It has been the desire of the writer to use this method of closure in old perforations which are larger, in conjunction with the flap operation which was described by Dr. M. A. Goldstein, but a proper case has not presented itself up to the presen time.

This operation has been performed by the writer on five cases, with complete closure in three cases, and the remaining two were failures, attributed to the large size of the perforation.

The third condition, illustrated in Figure 1, represents the type of cases in which the deviation and displacement of the quadrilateral cartilage is so marked that it produces nasal obstruction on both sides, as well as an external nasal deformity, and in order to properly correct this deformity and relieve the obstruction, it is usually necessary to remove the entire free end of the cartilage. This drawing represents a case which the writer first saw in January, 1914. The patient was a schoolboy, fourteen years of age, who had during childhood received a blow on the nose, causing a dislocation and multiple fracture of the quadrilateral cartilage, and since that time he was unable to breathe through his nose, with resulting mouth breathing, catarrhal condition of the upper respiratory tract and suppurative otitis. During July, 1914, under general anesthesia, the entire quadrilateral cartilage was removed by means of the submucous operation, and fearing that a flat nose might result, owing to the removal of the support, a large piece of quadrilateral cartilage which had been removed on the same day from a girl was introduced and treated in the manner mentioned above. At the present time, five months after the operation, the patient has good nasal respiration, the external deformity has been corrected, and the cartilage is palpable and in the proper position.

It is now the practice of the writer, in cases where it is found necessary to remove a large portion of the cartilage in order to allow proper breathing space, to properly treat and reintroduce the same, believing that in most cases the cartilage is not absorbed and continues to perform its function.

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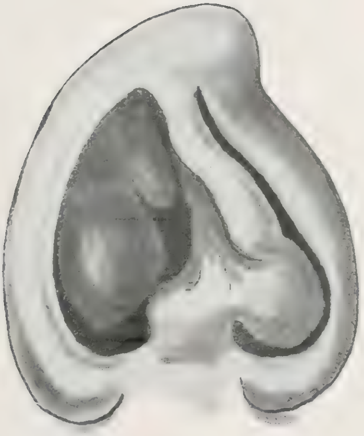

FIGURE 1.

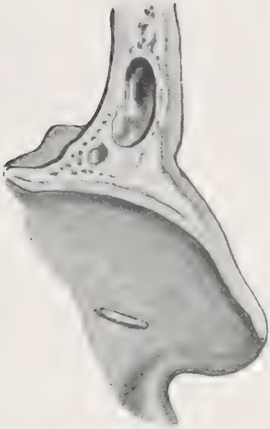

FIGURE 2.

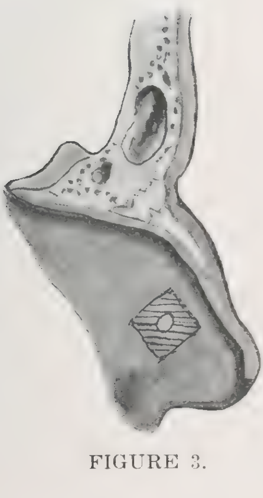

FIGURE 3.

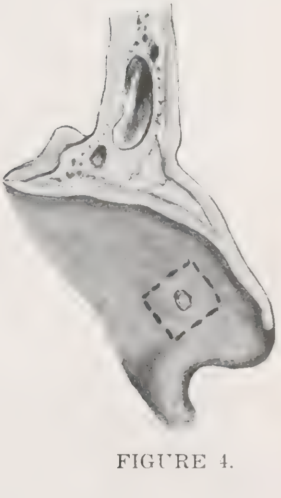

FIGURE 4.

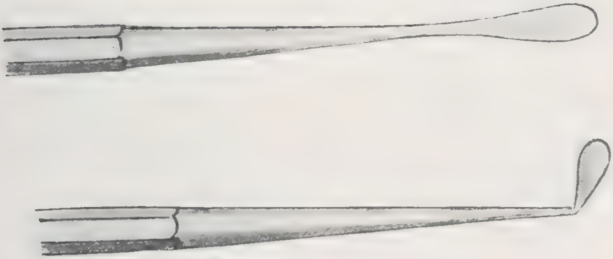

FIGURE 5.

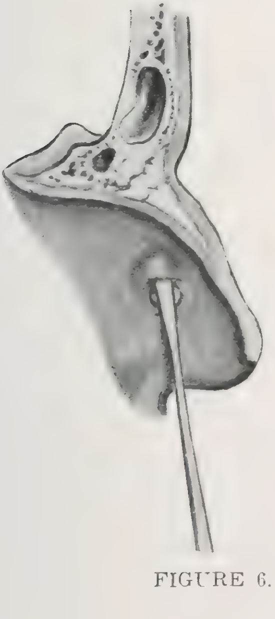

FIGURE 6.

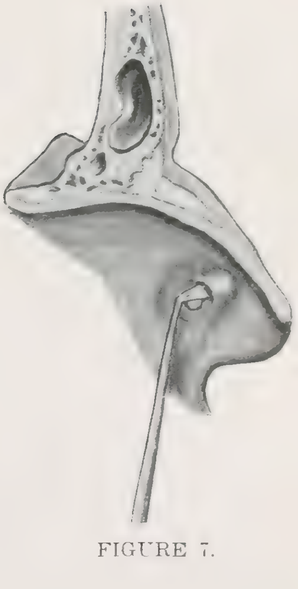

FIGURE 7.

XXXII.

A REPORT OF SOME UNUSUAL CASES OF DISEASE OF THE NASAL ACCESSORY SINUSES.*

By John R. Winslow, M. D.,

Baltimore.

It has been my fortune during the past few years to have encountered a number of cases of nasal accessory sinus disease presenting such unusual characteristics that I have felt them to be worthy of your consideration and discussion.

Case 1.—A case of congenital membranous obstruction of both choanæ, complicated by unilateral endonasal atresia and double suppurative sphenoethmoiditis. Operation. Practical cure. Miss Emma S., aged twenty years, was referred to me by Dr. Wayland Frames, with the history of being unable to breathe through or blow the right nostril—she could inadequately breathe through and inefficiently blow the left nostril.

This condition was attributed by the patient to scarlatina, occurring at the age of ten years, but the underdevelopment of the choanal structures, later discovered, leads me to consider it congenital.

The patient was pale, thin and underdeveloped. She suffered from headache and her general health was poor. Sense of smell lost. Hearing normal. Said that she had been operated upon unsuccessfully by two surgeons.

Examination.—External nose small; complete atresia of the right naris from a point about one inch within the nostril to the choanæ, this being due to cicatricial adhesions from the floor to the attic of the nose, with the exception of a minute canal at the floor of pinhead caliber, extending to posterior nares. Floor of nose covered with albuminoid mucus.

Left naris obstructed by a deviated septum and bony spur at its middle third.

Examination with the postnasal mirror showed obstruction of both postnasal orifices by a diaphragm, the right one having a small perforation at its lower septal attachment, and the left one having two perforations, one about the middle along the septum and another just above it.

Operation.—December 12, 1912, from half past two to four o'clock in the afternoon. An injection of Schleich adrenalin solution was made into the cicatricial area at various points. Powdered cocain being applied along the turbinals, a probe was inserted into the pinhole fistula, followed by a probe pointed bistoury, which cut upward along the septum and choanal edge.

A dense synechia between the middle turbinal and the septum was severed with a rectangular knife, and the middle turbinal was resected with Sluder's knife and the snare. Upon removal of the middle turbinal a large gob (one-half ounce) of mucopus dropped upon the floor of the naris. Removal of the turbinal exposed an opening into a large cavity, the sphenoid, whose anterior wall was necrotic.

The ethmoid cells were exsected with Grünwald's forceps and the necrotic anterior sphenoid wall removed. Frontal sinus and antrum were not molested. The right choana was found to be undeveloped and could not be greatly enlarged.

The naris was packed with gauze strips for three or four days, and the patient then furnished with a long splint of gutta percha for daily insertion, after syringing the nostril.

On February 13, 1913, an attempt was made, under cocain anesthesia, to cut the two perforations of the left diaphragm into a single one, with a long probe pointed tenotome and biting forceps; at the same time the bony spur at the middle third of the septum was removed with Hajek's chisel. Dressed with a long rubber covered Simpson splint. The patient was kept under observation until March 12, 1914.

At this time she breathed well through the right naris and could blow the same. There was little discharge and that mainly in the morning. Her general health was greatly improved. She could inhale through the left nostril, but had difficulty in blowing it. The postrhinoscopic picture showed a triangular opening at the lower septal side of the right choana.

By anterior rhinoscopy the movements of the pharynx could be seen through this.

On the left side was a single perforation about the middle of the membrane; the lower portion of the obstruction had not been removed.

The left side was not free, and the patient complained of suboccipital headache upon this side. Upon probing the anterior sphenoid wall felt carious and operation was advised.

On December 18, 1914, the patient was etherized and in the semirecumbent position the posterior half of the left inferior turbinal was removed with scissors and snare, and the middle turbinal with Sluder's knife and Grünwald's forceps.

Turbinal remnants and the posterior synechia were removed with the largest Grünwald, under the guidance of the finger inserted into the nasopharynx.

After completion of the operation the tip of the index finger could be inserted well into the left choana. An attempt was made to further enlarge the right orifice, but the bone was too dense to be cut. The left anterior sphenoid wall was carious and easily removed with sphenoid forceps.

A long rubber covered Simpson splint was used for twelve hours, and subsequently a cotton tipped applicator passed often enough to prevent closure of the opening.

Present Condition.—Following these operations, with the assistance of tonics, the patient improved greatly in her general health, and her weight, which had never exceeded ninety-five pounds, increased to one hundred and ten pounds; her appetite is good.

Her nasal breathing is excellent, and she can blow both nostrils satisfactorily. Headaches have disappeared. No pus is present in either nostril.

Both nostrils are free and the movements of the posterior pharyngeal wall can be seen through each side. The sphenoid openings are large and the interior of each sphenoid cavity can be inspected and probed.

The postrhinoscopic picture shows a moderate sized triangular opening to the septal side at the floor of the right choana, and a vertical ovoidal opening upon the left side, smaller than normal, but for all purposes adequate.

It seldom occurs to any one man to see many cases of congenital choanal obstruction. Some experienced observers have never seen a single case. The complications add to the rarity and interest of this case.

CASE 2.—A CASE OF MELANCHOLIC DEMENTIA DUE TO CHRONIC SPHENOETHMOIDITIS. CURED BY OPERATION. Mrs. Fred S., aged thirty-one years, married, one child, was first seen by me on February 10, 1907, complaining of inability to breathe through the right nostril. No discharge. Sense of smell lost.

Neuralgic pain at right temple and over right eye. No asthma. Left nostril at present clear, but she has had polypi removed from both nostrils. Whenever her nose becomes stopped she suffers from mental depression. Some years ago she lost her mind temporarily and was a resident of one of our insane hospitals. Duration of condition, seven years. At present she is sane, but peculiar and eccentric, with a coarse masculine voice. At times preceding her menses she exhibits epileptiform convulsions.

A polyp was removed from the right naris at this visit.

Patient was not seen again until February 26, 1908, when several polypi were removed from the right nostril, also in June, same year.

On December 17, 1909, she returned, complaining of severe headache, at times almost intolerable. Multiple small polypi were found in the left nasal attic and a medium size polyp in the right naris.

On December 21st an anterior ethmoidectomy was done on both sides with Luc's forceps, and the nasofrontal ducts probed.

Early in the operation the patient had an epileptiform convulsion and collapse, requiring the use of stimulation. The operation was completed (cocain anesthesia), when the patient became unconscious and remained so for several hours; pulse and general condition good. She then disappeared until May, 1913, when she returned, complaining of return of headache and mental depression.

Multiple polypi were found in both nostrils and a diagnosis of chronic sphenoethmoiditis was made.

May 12, 1913, multiple polypi were removed from both nostrils and the ethmoid cells exenterated with Grünwald's forceps and Worthington's curettes.

The anterior wall of both sphenoids was removed. The patient fainted many times during the operation, under local anesthesia, and at the termination became unconscious and remained so for two hours.

She was seen at intervals until Novemer 4, 1913. At this time she had had no headaches and her mental condition was normal. No polypi were present and both sphenoids were wide open and accessible to treatment.

Subsequently the patient left to take up her residence in Texas. The climate, however, did not agree with her, and she returned to Baltimore, and was seen by me on July 20, 1914. At this time I removed a large polyp from the right nostril and several small anterior polypi from the left. Both sphenoid fistulæ were wide open, exposing the interior of the sinuses.

The patient has been seen at irregular intervals since, and was last examined January 26, 1915.

She was in splendid general and local condition: looks and feels well; her voice is much softer and more feminine.

She is conscious of a change in herself and no longer feels and acts "queerly," as she formerly did. She rarely has fits of depression.

Although the influence of nasal conditions on the mental faculties was recognized by the ancients, I am convinced that cases of mental disease are at times classed as "incurable" without adequate examination of these regions.

Although an inmate of one of our best conducted institutions, as far as I can learn from a most careful inquiry, no examination of the nose by an expert was ever made or suggested in this case.

CASE 3.—A CASE OF SUPPURATIVE SPHENOETHMOIDITIS SIMULATING OZENA AND CAUSING MENTAL CONFUSION, IMPAIRED MEMORY, INTENSE HEADACHE AND BLURRED VISION. CURED BY OPERATION. Miss Rita T., aged twenty-four years, single, consulted me on January 17, 1912, with a discharging left ear, mastoid tip tenderness, but normal temperature. After a free myringotomy and under suction irrigation with Fowler's douche, the condition cleared up in eleven days without further operation. During this attendance I learned the following history:

Patient had suffered for years from a loss of sense of smell, associated with a scabby discharge of foul odor, unless the nose was kept clean; this was told me by the patient and spoken of by her friends.

She suffered also from headaches of a mixed form, at times neuralgic in type, temporal and supraorbital in location, at other times dull and suboccipital, and again a combination of the two. These headaches had no relation to the menstrual periods.

When suffering from these attacks her vision was frequently blurred, and at times she exhibited a dazed mental confusion, so that she did not know in which direction to go. This syndrome she terms "spells." On one occasion she had manifested embarrassed respiration and loss of consciousness for about an hour.

Upon examination both nostrils were found to be filled with moist scabs; the left inferior and middle turbinates were atrophic. Upon aspiration, after cleansing, pus was seen exuding from the sphenoid, whose outer wall was covered with granulations. Probing caused pain similar to the suboccipital headache to which patient was subject. No ostium sphenoidale could be found. Creamy pus was seen trickling over the head of the left middle turbinal.

On March 13, 1912, under twenty per cent cocain, the left middle turbinal was removed with Luc's forceps, and granulations and bone curetted from the anterior sphenoid wall.

As no ostium could be found, further operation was postponed and the nose was packed with gauze strips. The patient endured the operation well and left the operating room in good condition.

Some fifteen minutes later she began to exhibit convulsive seizures of an epileptiform character.

This seizure being typical of others which followed later, I shall describe it somewhat in detail. The patient was unconscious with pupils widely dilated. Her forearms were contracted, fists tightly clenched and legs drawn up against the abdomen. She would continually thrash her arms about from side to side, striking herself or anyone within reach, unless restrained. At times the body would assume a condition of opisthotonos. The respiratory movements increased in rapidity until a condition of apnea ensued. The patient would then hold her breath until one began to wonder whether she would ever breathe again.

A slow inspiration would then occur, followed by increasingly rapid breathing and a repetition of the cycle (Cheyne-Stokes).

During this time the pulse, though rapid, was good. This seizure lasted about five hours, was of a most alarming nature, and the convulsions could only be controlled by etherization. At the end of the attack the patient suddenly regained consciousness.

The nature of this seizure will be discussed later on.

March 14th the nasal packing was removed, and by March 26th all wounds had healed.

Treatment of the mucous membrane with a pigment of thigenol was begun, and the patient put upon Blaud's pills, fresh air and rest.

She was very nervous, with twitching muscles, and on one or two occasions had fainting spells. When seen on April 29th the nasal mucous membrane was much improved, presenting a small amount of clear mucus resembling syrup. She had had no suboccipital or severe headache. Was very nervous and went away for a two weeks' change. After her return she was seen and treated at varying intervals until December 11, 1912, when she reported that she had had no return of her "old headaches," her nerves were much better, and she no longer had "spells."

The nose was quite clean, contained no crusts and only a small amount of mucopus in the anterior ethmoid region. The patient was furnished with a nasal syringe douche for home use and treated at the office at increasing intervals until June 25, 1913.

At this time she stated that she had had a terrific suboccipital headache the preceding day, and on several occasions previously, sometimes in morning and sometimes in evening. By systematic probing I finally discovered the ostium sphenoidale situated high up and far around to the septal side of the anterior wall of the sphenoid. This was a very narrow opening leading into a large cavity, lying partly upon the opposite side of the septum. The bone within the sinus felt and sounded bare.

Opening up of the sphenoid was advised, but deferred by the patient.

On September 16, 1913, she returned, complaining of dull headache on left side, mental depression, loss of memory and confusion in orientation. Operation was insisted upon and performed under local anesthesia, duration about three-quarters of an hour.

A large sphenoid sinus was opened up, and overlapping this to the outer side a large posterior ethmoid cell containing pus.

Convalescence was prolonged and attended with severe suboccipital headaches and general weakness. On October 22nd she reported that she had had no headaches for a week and felt fine. No mental confusion since the operation. Headaches became less frequent and severe and changed their type from suboccipital to vertical.

On January 28, 1914, she reported that she had been without headache of any kind for ten days.

On that day she had a slight dull pain on the left side of the head; this was relieved by cocain carbolic application within the sphenoid cavity.

On March 6th she complained of a severe hemicrania on the right side, which was relieved by cocainization of the right and left sphenoid (Sluder's method). Four days later a milder attack was benefited in the same way.

Shortly afterward the patient was seized with pain and swelling over the appendix and was confined to the house, but no operation was done. This appendicitis was probably secondary to the nasal suppuration. She has had no subsequent attack.

On May 23rd the patient reported that she had had no trouble at all for six weeks; had increased in weight and "felt better than she ever did in her life." Her looks confirmed this statement.

She reported again on July 13th with a recurrence of headache on the left side, which was found to be due to a protuberant mass of granulations which was removed from the sphenoid fistula.

On October 13th she reported that she had been having severe suboccipital headaches, mostly on the right side.

About one week previously she found that she could not use her left limb upon awakening, but this passed off during the day. She also told me that about one year before this she had a similar attack on the right side in a "movie parlor" and had to ride home in a taxicab. The first attack lasted for a period of six days, during which she was confined to bed.

At this period I had visions of a latent brain abscess. The alarming symptoms did not recur, and I insisted upon operation on the right naris.

This nostril presented the following conditions: Considerable sticky mucopurulent secretion from hyperplastic ethmoiditis, the hypertrophied middle turbinal being so tightly jammed against the septum that a fine probe could scarcely be forced between them. Under cocainization the probe could be passed into the right sphenoidal ostium.

A radical sphenoethmoid operation was done on November 3, 1914, by Mosher's method, under ether; time about one and one-quarter hours.

The ethmoids were somewhat sclerosed and shallow. The sphenoid was of medium size and the ostium higher up and farther to the ethmoid side than normal. This was enlarged by the usual method, and the left sphenoid fistula, which had somewhat closed, was reopened.

Ether anesthesia was employed under the idea that the convulsive seizure of the previous operation may have been due to cocain intoxication. Notwithstanding this, the usual epileptiform convulsions occurred, although by no means as severe nor of as long duration (about four and one-half hours).

These also could only be controlled by repeated etherization. As before, the Cheyne-Stokes respiration was exhibited. Shortly after the operation a hemorrhagic effusion occurred into both eyelids of the right eye, closing the eye and causing a black eye that lasted for some weeks.

At the first dressing on November 10th, a slight tendency toward convulsive movements was noted, but no further consequences ensued, and the patient left the hospital on the following day.

From this time she has progressed favorably, gaining flesh and strength, assisted by tonics, and on January 28, 1915, stated that "she had never felt as well in her life."

Patient returned on February 5, 1915, complaining of a bad headache located at the posterior portion of the vertex.

There was no congestion nor swelling within the nose, and drainage was unimpaired. A one per cent carbolized oil instillation was made into each sphenoid cavity, and the headache disappeared the same evening.

She was not seen again until February 23rd, when she reported that she had had no trouble for two weeks and never felt as well in her life. There was little nasal secretion, the sphenoid fistulæ were wide open and the interior of these cavities looked dry and healthy.

Regular treatment was stopped at this time.

Six weeks later (about April 1st) patient reported that she had had no trouble until that day, when she had a slight headache.

An instillation of two per cent carbolized oil was made into the sphenoids, and the patient has not been heard from since.

Of course I am aware that the word cure cannot be employed in an absolute sense in a case of this kind, and that she will always have to devote attention to her nose herself and be kept under observation.

Aside from slight and occasional headaches, all serious symptoms have disappeared; her general and nervous condition is excellent; she has gained in weight, feels well and looks well.

Several interesting questions arise in connection with this case.

What was the nature of the impairment of motion of the legs, described by the patient as occurring on two distinct occasions?

In a person of her neurotic temperament, hysteria might well serve to explain this and subsequent nervous phenomena, and the short duration and spontaneous recovery without serious consequences, would seem to substantiate this view. And yet I must confess that I was much alarmed when I learned of these occurrences, and feared brain abscess or other grave cerebral conditions. Unfortunately, I was not summoned at the time and had no opportunity of observing the attacks.

Efforts to secure a neurologic consultation did not meet with the approval of the patient's parents, as the condition was so transitory and there were no ill after-effects.

What was the nature and significance of the epileptiform seizures following each operative manipulation? The first attack I was inclined to attribute to cocain intoxication (twenty per cent) and nervous excitability; but the pulse was good; there was no cyanosis, and there was no sweating nor clamminess of the skin. Moreover, a similar attack occurred under ether anesthesia. Observation of the seizures with the violent movements of the arms and legs, and opisthotonos, suggested hysteria, but she was unquestionably unconscious, and would have injured herself had these movements not been controlled.

In my opinion, hysteria does not account for all of these nervous phenomena; but there was some irritation of the higher centers of the brain and cord, originating in the nose and transmitted through the nasal branches of the fifth nerve.

Some suggestion of an epileptic inclination was afforded by the general tonic and clonic spasms, and loss of consciousness.

In this connection the "spells" manifested at times by the patient should be considered. These were attended with mental depression, impaired memory and mental daze, with and without headache.

Upon her visits I frequently noticed that the patient seemed in a condition of great nervous tension, manifesting spastic contraction of the arm and leg muscles, and at times the face. Could these manifestations be regarded as "epileptic equivalents" originating in the nose from reflex irritation or toxic absorption, and acting in the brain?

The headache in this case was of a complex type, and due partly to toxic absorption, partly to reflex irritation from pressure contact and pus retention, but largely to irritation of the sphenopalatine ganglion, as proven by the result of the local treatment.

Amblyopia was a part of the syndrome which she designated as "spells;" this existed only during the attacks, and in the intervals vision was normal.

This is one of the commonest of the many ocular complications of sinus disease, especially the posterior ethmoid and sphenoid sinuses. Its cause is not well understood, by some being attributed to pressure and reflex irritation, and by others to absorption of toxins.

CASE 4.—A CASE OF FRACTURE OF THE SKULL INVOLVING THE LEFT FRONTAL SINUS, ROOF OF ORBIT AND NASAL WALL, PRODUCING A SELF-PERFORMED KILLIAN OPERATION. EXPOSURE OF THE BRAIN. SUBSEQUENT INFECTION AND EMPYEMA OF THE FRONTAL SINUS, DRAINING THROUGH THE NOSE. OPERATION—CURE. James S., a colored man, aged thirty-four years, of rather low intelligence, was referred to me by my colleague, Dr. S. K. Merrick.

He had been admitted to the surgical department of the University Hospital on October 30, 1913, with the history that in the preceding June he had run into a post while playing "catcher" in the dusk.

This was followed by neuralgic pain in the head and pain in swallowing, which symptoms improved later on.

Upon entering the hospital he exhibited a swelling in the frontal region and marked edema of the eyelids of both eyes, especially the left. This had existed for about ten days.

Temperature and leucocytosis were normal. Also eyegrounds and pupillary reaction.

A radiogram taken at this time showed large unusually clearly defined frontal sinuses, with no evidence of the conditions subsequently found.

Noticing a foul odor and profuse purulent discharge from the nostrils, the case was transferred to the nose and throat department for treatment.

Examination of the nose at this time showed obstruction of both nares, the left naris being almost blocked above by a greatly deformed septum; probing discovered bare bone. Both nostrils contained moist scabs of a foul odor, and a profuse purulent discharge existed on the left side.

External frontal operation was determined upon, and performed under ether (vapor apparatus) on November 28, 1913, with the assistance of Prof. Merrick and Dr. Stem.

Owing to the great infiltration of the supraorbital tissues, I incised very slowly and carefully through these, and not encountering bony resistance at the usual depth, by the use of the probe I discovered that the anterior sinus wall was missing; I also found the sinus cavity to be filled with granulations, and could not detect the bony resistance of the posterior wall. Very cautiously the mass of granulations was removed and the sinus cleaned and dried; it was then seen that the greater part of its posterior wall was destroyed and the cerebral dura exposed over an area as large as a twenty-five cent piece.

At the lower inner angle of the sinus a loose mass was detected, which with a little manipulation was extracted; this sequestrum measured about one and one-half by one-half inches, and upon study proved to consist of the left nasal process and a portion of the nasal bone, together with the inner portion of the lower orbital rim and floor. I also removed a loose piece of bone from the top of the nasal septum, and fragments from the floor of the frontal sinus.

After cleaning up the operative field, upon careful examination I observed at the upper inner angle of the sinus a gray convoluted area, which resembled and which proved to be anterior frontal convolutions. These were exposed over an area as large as the little fingernail and were denuded of dura mater.

This fact was substantiated at the time of operation by a general surgeon who was present, and subsequently during the dressing by another experienced general surgeon.

The operation was completed and the nasal wound closed, but the frontal was left wide open. Upon applying the dressings I remarked to my assistants and students that I did not expect the patient to survive forty-eight hours.

The following day he showed little effect from the operation, and in fact I was told that he had gotten up in the night and attempted to go to the toilet unassisted The dressings were changed the following day and daily thereafter as long as necessary—subsequently at longer intervals—by myself or my interne, Dr. Stem.

For a time there was considerable swelling and soreness of the left forehead above the sinus region, and much pus could be stripped down by pressure. On two occasions sequestra of considerable size worked their way slowly downward into the wound area and were removed.

No general symptoms of interest were manifested until December 19, 1913, when the temperature rose to one hundred and two degrees and cough developed, marking the onset of a bronchopneumonia, through which he was successfully piloted by my colleague, Prof. Zueblin.

The patient remained in the hospital and was dressed at suitable intervals until June 4, 1914.

The only noteworthy occurrence during this period was exposure to a case of smallpox, necessitating the quarantining of himself and the entire ward.

At the time of his dismissal the patient was going about doing odd jobs around the hospital.

The greater part of the wound had closed, and the skin of the forehead had been turned in and had covered over the exposed brain.

There was a slight mucous or mucopurulent discharge at the lower inner angle of the fistula.

The patient dressed this himself with a piece of gauze and adhesive plaster.

He also used an alkalin nasal douche with a syringe.

Having in mind an ultimate plastic operation, which I hesitated to perform at the time, and wishing to keep this case under observation, he was retained as orderly in one of the wards of the University Hospital. He was seen from time to time, and upon one examination I discovered an empyema of the left antrum and a right nasal sequestrum.

The frontal wound was in good shape and required little attention.

He was last seen early in April, 1915. I was preparing to correct the nasal and antral conditions, when for some infraction of discipline he was dismissed from his position.

This was nearly two years from the date of injury and one year and four months from the date of operation. Of this time (one hundred and eighty-four days) six months were spent in the hospital.

I am aware that there may be some question as to the origin and nature of the conditions present in this case. Personally I am convinced that a traumatic fracture of the frontal bone and both walls of the frontal sinus, associated with fracture of the nasal process and orbit, occurred. Also of the nasal septum.

Subsequently the sinus became infected from the nose, setting up an empyema, which would have resulted in serious consequences but for the excellent drainage which was afforded by the accident.

I am led to this belief by the definite history of injury and the clean-cut appearance of the sequestra removed. Also the absence of a syphilitic causation, established by a negative Wassermann—not once, but on several examinations.

Another question which I would like to hear discussed is as to the proper line of conduct in a case of this kind. Granted that all sequestra had been removed and that suppuration had ceased, would it be good judgment and conduct to dissect up the skin and attempt to correct the deformity by a plastic operation, or would it be wiser to "play safe" and let it alone?

In conclusion, I hope that these case histories have proven of sufficient interest to justify their presentation and the use of the term "unusual" employed in the title of the paper.

XXXIII.

SURGICAL DISEASES OF THE SUPERIOR MAXILLA.*

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The surgical diseases of the superior maxilla are quite within the province of rhinologists, and it is the object of this review to bring to their attention the various infections and neoplasms which may primarily be found either upon the surface of or within the maxilla, believing that they are not usually given that attention and consideration which their frequency and imperative early diagnosis entitles them. It has always been the custom to apportion the surgery of this region to the general surgeon, the rhinologist and the surgeon dentist; and it has been the complaint of the general surgeon for some years that these conditions of the superior maxilla, especially the malignant neoplasms, reach him when all hope of cure, by operative intervention, is past. Within the last few years the dentist has awakened to this state of affairs, and is not willing to allow any of these diseases which may come under his care to continue long without positive diagnosis. It is the opinion of the writer that rhinologists should not hold themselves responsible for antral and nasal conditions only, but should have a thorough working knowledge of the diseases to which this part of the body is subjected, and while it is not necessary for them to be absolutely familiar with their operative surgery, it is essential that they be familiar with and responsible for their diagnosis by their clinical symptoms, gross appearance, by section or incision.

From the rhinologic standpoint the diseases of the superior maxilla are: 1. Infections. 2. Neoplasms.

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I.—INFECTIONS.

The infections to which the superior maxilla may be subjected are those affecting the alveolar process and those of the maxillary sinus or antrum. The presence of the teeth, with their tendency to suppuration and necrosis, is responsible for the greater number of these infections of the alveolar process; but we must not forget that certain specific and toxic inflammations are likely to show unusual activity in this region.

Alveolar or Subperiosteal Abscess.—The portal of entrance for this infection is from the diseased tooth through the root canal to the periosteal lining of the tooth socket. This condition is of rapid development and easily recognized, as the tooth affected is sensitive, painful and slightly protruding, with a small localized abscess as the result.

Periostitis and osteomyelitis also result from tooth infection, though they may also result from the specific inflammations. They require incision, not only to establish their cure, but to establish, with certainty, differential diagnosis in those cases that the lesion may lead one to think of the more serious diseases which develop under similar conditions.

Necrotic Caries.—This condition is now known to be a tubercular one, usually engrafted upon a previous pyogenic infection. It may show as a swelling and later slow forming abscess, either below the infraorbital ridge or in the canine fossa. It must often be differentiated because of its slow development and tedious course.

Actinomycosis is a specific infection of the soft tissue and rarely involves the bone until its later stages. This is a rare condition, but it must be borne in mind and differentiated from the chronic abscesses or neoplasms which it has been known to simulate, by examination of the purulent discharge.

Syphilis may affect the alveolar process, either as a periostitis or gumma; this latter may be mistaken for a true neoplasm, and in all cases of doubt the test should be applied. It is only necessary to recall that unusual forms of both lead and phosphorus poisoning must be excluded in diagnosis of affections of the upper jaw.

Maxillary sinuitis is the commonest and most obstinate of the infections of the superior maxilla. It is almost invariably secondary to or associated with diseases of adjacent structures, the acute inflammatory conditions of the nasal mucous membrane being the most frequent factor; infections about the roots of the teeth, that are found in close proximity to the antral floor, are another frequent cause and account for about twenty-five per cent of these infections (Skillern). Cryer says that, in his opinion, "more cases of diseases of the teeth occur as secondary to diseases of the antrum, than the reverse;" a point which we are likely to overlook, though consensus of opinion does not admit the likelihood of this statement. We have learned that necrosis of the teeth is directly responsible for antral infection much less frequently than was previously supposed (Luc, fifty-five per cent). Again, infection from other sinuses may gain entrance to the antrum, either through its normal ostium or abnormal openings. From the buccal cavity infection may enter through a fistula left by the removal of a tooth, the roots of which either pierced the antral floor or perforated it when it was drawn. I have had two such cases very recently.

The antrum is practically a closed cavity, lined with mucous membrane, and with bony walls of varying thickness; so that we have a cavity favorably formed to retain and nourish infection. The mucous lining is more of the endothelial type, hence has less resisting power, so that caries of the bone from its infection is a more frequent occurrence. As the antral cavity is rudimentary up until the sixth or seventh year, sinuitis is practically unknown in childhood. Maxillary sinuitis may be either acute or chronic.

Acute sinuitis produces a feeling of distention and pressure in the maxilla; sensitiveness to pressure in the canine fossa; pain usually continuous and severe, due, Cryer says, to the fact that the branches of the inferior dental nerves which cross the floor of the cavity are protected only by the mucous membrane lining the cavity, and hence exposed almost directly to both irritation and pressure; pus in the nasal cavity, often seen escaping from the normal ostium under the middle turbinate bone. These are characteristic of this infection, together with the general symptoms of pus absorption: chills, temperature, and sometimes sweats. As in its acute stage sinuitis could scarcely be mistaken, it is, however, necessary to differentiate between the chronic form and some of the local conditions found in the superior maxilla.

Chronic sinuitis is usually the prolongation of the acute form. The pain is far less marked or even absent; the feeling of distention and pressure, however, still persist; constitutional symptoms are very slight or absent, yet the patient is much more likely to be mentally depressed and indefinite. Positive diagnosis may be made by puncture only; even in the hands of the experienced, considerable difficulty may be met with in diagnosing the presence of malignant growths and excluding the possibility that the antrum may be distended with pus and granulation tissue. Where the slightest doubt exists, incision through the canine fossa should be carried out and thorough inspection made. Glandular involvement is not present, nor is there ever bulging of the walls of the sinus. Sinuses do not form, nor does the diseased area grow progressively larger.

II.—NEOPLASMS.

In no other part of the body do we find new growths developing with such relative frequency or variety as in the superior maxilla. Not only do we see the usual types of malignant and benign growths which spring from epithelium, the connective tissue and the bone, but also a number of neoplasms of special characteristics, which develop directly or indirectly from the teeth. These latter are of great importance, both because of their frequency and in that they represent a large percentage of the neoplasms which may be cured by operative intervention.

Broca states that "the prognosis of tumors of the maxilla, at all times and in all forms, is far from good, and for this reason early diagnosis and differentiation is essential." I am, however, convinced that if this latter part of Broca's statement be observed, the prognosis of neoplasms of the maxilla need not be unfavorable. That carcinoma and the more malignant forms of sarcoma are not cured by operation, no matter how radical that procedure, is admitted; yet we know that these primary malignant growths are in the minority, and if the nonmalignant and less malignant tumors be early differentiated, so that less radical surgery be practiced upon them, the number of operative cures will be and already has been increased and our prognosis of neoplasms of this region much more favorable. Bearing in mind that these new growths of the maxilla have the same general characteristics which distinguish them in other parts of the body, an effort will be made to include all of them which have been found, as well as to point out any special characteristics which they may exhibit in this particular situation.

It is usual to classify new growths as follows: Benign, when they grow by expansion and are encapsulated, or malignant, when they grow by infiltration. This would be an ideal working basis, if all of the neoplasms found in the maxilla could be definitely placed in one or other of these two classes. The rule that "malignant growths cause death, no matter in what situation they occur, and that benign ones may cause death, depending on their environments," is a well proven one. Yet in attempting to divide all neoplasms into these two groups, we find some new growths which are "borderline tumors," and others which we must class as both benign and malignant, depending on their type. Epulis, for instance, should be classed as a benign growth, and is, in its commoner form; yet the fibrosarcoma type is malignant. Neoplasms grow by the multiplication, through indirect division, of their own cells, not by the transformation or degeneration of these cells into tumor cells. They are independent, uncontrolled overgrowths of normal cells, though apparently possessing greater vitality. Tumors all tend to differentiate as do normal cell tissues. If the growth is rapid, as is seen in the malignant forms, this differentiation is not marked, but if the growth is slow, it is likely to be typical and sectional diagnosis comparatively easy. "The type cell is the one important element in every tumor, and from it the tumor should be named, not from some peculiarity of minor importance, such as method of growth, arrangement of cells or form of retrograde change" (Mallory).

The classification of Bland-Sutton—who presents it saying: . . . . "the study of the minute structures of tumors convinces us that they are composed of tissues normally existing in the body; pathologists realize that the structure of a tumor invariably corresponds with that of the tissue in which it grew"—seems to me to be the most reasonable and the one best suited for this review of tumors of the superior maxilla.

1. Neoplasms of the Connective Tissue:
    - Chloroma.
    - Chondroma.
    - Endothelioma.
    - Epulis.
    - Fibroma.
    - Myeloma.
    - Osteoma.
    - Sarcoma.
2. Neoplasms of the teeth:
    - Odontoma.
3. Neoplasms of the epithelial tissues:
    - Carcinoma.
4. Cysts.

Chloroma is a diffuse hypertrophy of the alveolar border, occurring simultaneously in both upper and lower maxilla and extending uniformly in every direction. This is an exceedingly rare condition and has always been seen associated with lymphatic leukemia. It occurs as a diffuse overgrowth, apparently of the superficial tissue, in which the teeth may be completely or partially buried; does not markedly involve the bony structure and never the tissues of the face.

The differentiation of the neoplasm should give no difficulty, as the parent disease, leukemia, is always very evident with its remarkable increase in the circulating leucocytes, enlargement of the spleen, etc.

Chondroma.—This is another of the rarely found neoplasms of the superior maxilla. Composed of cartilage cells which spring from the periosteum of the canine fossa. They have been known to reach large size and are usually encapsulated. Clinically, chondroma cannot be differentiated from the chondrosarcoma, except in the two instances: that it is less likely to produce secondary deposits in other organs, especially the lungs, and that its rate of growth is likely to be much slower.

Endothelioma is a rare neoplasm originating from the endothelial cells of the inner walls of the veins or more rarely the lymph spaces. While these tumors are rare, they are said to occur by preference in the mucoperiosteum of the superior and inferior maxilla (Bland-Sutton), but I have been unable to find reports of endothelioma in literature as occurring in this region.

They usually form nodules, rather soft in consistency, which do not grow to any size, and are prone to degeneration, though very little to infiltration, hence of not very malignant type. Clinically indistinguishable from epithelioma, in its early stages, especially when it occurs within the antrum.

Epulis is a connective tissue tumor arising from the periosteum of the alveolar process or from the connective tissue of the tooth in its socket. This growth is the least malignant of all forms of sarcoma, though it is of the pigmented variety and giant cell type.

Two forms of epulis are recognized: the myeloid or soft cell type, which is an inflammatory fibroma, and the fibroid, a true fibrosarcoma. In my own experience I have not seen the fibroid form in the superior maxilla, nor have I found reference to it in the investigation of writers on this subject, except that of Eve, who says that they do occur, and advises that microscopic differentiation be made in all cases, so that the surgeon may know how radically he may have to deal with this growth, since the myeloid or inflammatory form is distinctly benign and the fibroid is likely to recur. In this differentiation it is to be noted that the myeloid form springs from the cancellous tissue and has a homogeneous intercellular substance, containing within it some giant cells in small proportion; while the fibrous form shows a distinctly fibrillar matrix and is entirely made up of giant cells.

The myeloid epulis is a disease of early adult life and primarily is confined to the alveolar surface of the maxilla, appearing at the mucous margin of the tooth, or less frequently in the cavity left by the removal of a tooth. Its growth is slow and may be either in concentric or cauliflower form; covered with mucous membrane and without pain or tenderness. As it increases in size the epulis extends outward from the bone in all directions, but does not involve it, the color becoming a deep red, due to its great vascularity. Epulis is a curable growth. Most authorities recognize a marked tendency to recurrence, but my experience with their removal leads me to share, with Bloodgood, the belief that the occurrence is due to incomplete removal. Epulis does not produce metastases or glandular involvement, unless secondary infection of the growth takes place. That an epulis is ever epitheliomatous is very doubtful. A microscopic study of nine cases has proven them all of the myeloid type.

Fibroma is one of the less frequent neoplasms of the superior maxilla; in this position it does, however, develop and may grow to large size. In the reports of some years back we find descriptions of unusually large tumors, particularly in the antrum, which are said to be fibromata.

This growth differs, in the maxilla, very little from fibroma in other parts of the body and is, particularly in physical characteristics, like fibroma of the uterus; being dense, hard, irregular or nodulated in surface, not given to metastases nor to the invasion of surrounding tissues, except by direct pressure in the line of its growth.

In this region we recognize two forms: the periosteal, from the alveolar process, and the endosteal, from the interior of the bone; the latter more frequently making its way through pressure necrosis into the antrum or the nasal cavity, where it often hangs remarkably free. Fibromata are of slow growth and are particularly disposed to calcareous or necrotic degeneration, though the latter occurs most frequently through mechanical irritation, such as puncture, section or efforts at removal. It does not involve either the skin or the lymphatic structures, and since it grows expansively it is not dangerous to life, except through its size, location or pressure which it may exert. The periosteal type, in its early growth, must be distinguished from the true epulis.

A case of unusual interest is that of a man of fifty years, who presented himself with a hard, dense mass, irregular in surface, covered with normal mucous membrane, upon the hard palate, extending from the canine tooth of the left side to the middle line of the hard palate. Section of this growth proved it a fibroma, and removal was effected with little difficulty. Six months later the external wall of the antrum was noted to be slightly bulging and the lower eyelid became edematous. The patient complained of no pain, showed no glandular involvement, nor any sign of recurrence at the seat of operation. The antrum was then opened and a fibroid mass exposed which occupied nearly the whole cavity and apparently sprang from the lower anterior wall and floor.

This was removed, and the alveolar process, together with part of the anterior wall and floor, were resected, with no recurrence to date (two and one-half years). This was a fibroma of evidently periosteal origin, with the growth into the antrum and roof of the mouth synchronous.

Myeloma develops from the cancellous tissue of the bone, showing on the alveolar border of the maxilla as a deep red, very vascular tumor, usually of small size. They are exceedingly rare in any part of the body, but are said to exhibit a marked tendency for the alveolar border of the maxilla. Here it cannot be differentiated clinically, though microscopically it is often typical. This growth is given to diffuse infiltration, though glandular involvement is not marked. It is a disease of the young, having been rarely seen after the twenty-first year.

Osteoma or ossifying periostitis is a bony new growth, and in the superior maxilla gives rise to a uniform swelling, with a broad base upon the alveolar surface, just above the tooth margin, due to the deposition of new bone tissue. Syphilis has always been thought to be the cause of these neoplasms, but their almost invariable coexistence with the pyorrhea alveolaris has led to the recent belief that the latter is the determining factor in this disease.

The mixed form, both cancellous and compact, is the osteoma most frequently found in the maxilla. They are, in themselves, benign and painless, unless they encroach upon nerve trunks in their growth; and while they never reach any great size, may cause considerable inconvenience because of their position. From a differential diagnosis standpoint they are important, as an osteoma might readily be mistaken for osteosarcoma. The former involves only the surface and is a new growth upon that surface, while the sarcoma is a neoplasm of the body of the bone, tending to growth in the direction of its surface.

That osteoma occurs on the antral surface of the maxilla is very doubtful. A few have been reported—some of them to have reached great size—but both Sutton and Broca believe that these antral growths are odontomes.

Sarcoma is, of the malignant neoplasms, the one most frequently found in the superior maxilla. In this situation it preserves the same characteristics which distinguish sarcoma in other parts of the body, though it is far more frequently seen developing from the periosteal cells than from the medulla. All of the connective tissues contribute to this group of sarcomata, so we have:

(a) Fibrosarcoma.
(b) Myxosarcoma.
(c) Chondrosarcoma.

Fibrosarcoma originates in the same tissues as does the fibroma, but is more frequently seen than its prototype. It is distinctly a periosteal growth, and because the mass is made up of spindle shaped cells held together by heavy masses of fibrils, it is, perhaps, better known as the spindle cell sarcoma. It is characterized by its rapidity of growth; its tendency to infiltration of surrounding tissues; slight metastases by way of the blood stream and no apparent glandular involvement.

Myxosarcoma, of the three forms, is the one most frequently found in the superior maxilla, particularly within the antrum, where they are classed as the most malignant of the sarcomata. They may reach considerable size, are soft to the touch, and are rather paler in color than most new growths. Though usually encapsulated, it is given to the formation of finger-like projections which invade even the cheek. Glandular involvement has been noted, but it is always slight.

Chondrosarcoma is the least frequent and least malignant of the sarcomata of the upper maxilla. They arise from the periosteum as nodulated, encapsulated tumors, usually growing expansively without glandular involvement. Hard to the touch and mottled in color, due to the grouping of the mixed cells which go to make its mass. Chondrosarcoma of the maxilla is said to have a peculiar tendency to metastases of the lung tissues. Sarcoma in this region is most common between the ages of eighteen to twenty-eight years, differing from carcinoma which is a disease of past middle age. All forms are characterized by rapidity of growth, a certain regularity of form, a tendency to the involvement of the whole structure by expansion of growth, the early appearance of pain and the lack of definite glandular involvement.

Odontoma is a neoplasm of dental origin, composed of the hypertrophied tooth elements, either in their germinating stage or from teeth still in the process of development, never from fully developed teeth. (Broca.) The three histologic elements which enter into the formation of the teeth are, in this growth, found in various arrangements, containing spaces in which are found fragments of tooth structure or an imperfectly developed tooth or teeth.

Two distinct types are recognized: the follicular, and the adamantinoma. Follicular odontoma usually develop from the molar teeth, and is sometimes known as a dentigerous cyst, though in this classification we do not recognize them as true cysts. It occurs as a small mass within the alveolar process with fibrous walls, which tend to calcification. The adamantinoma (composite) occurs as a new growth composed chiefly of the cementum and enamel forming epithelial cells, hence exceedingly hard, in branching masses. This latter form is particularly likely to invade the antrum.

The history of all odontomata is of interest, in that they may and usually do remain quiescent for years, then suddenly begin to grow, inducing irregular neuralgic attacks and, as they increase in size, mild constitutional symptoms of peculiar range. I have recently seen two cases of odontoma of the superior maxillary, one a man aged twenty-six years, the other a lady of forty years, in whom neuralgia of very severe type and slight swelling of the alveolar process just above the tooth margin were the only symptoms. Both have been completely relieved of this pain by the removal of the neoplasms.

Odontoma grows by expansion, and very slowly, though they may reach considerable size and destroy much tissue by pressure. Does not give rise to metastases or glandular involvement; so is benign. The bone-like swelling, however, is not characteristic, and because of its frequency, all neoplasms of the maxilla from which we cannot absolutely exclude the odontomata should either be explored or have X-ray pictures made; the growth is usually shown characteristically by the latter.

Carcinoma occurs as a primary neoplasm of the superior maxilla less frequently than as a secondary new growth, yet it ranks next to the sarcomata as being third among the primary tumors of this region. It is an epithelial overgrowth, and hence may spring from either the alveolar surface or the surface of the antrum and nasal plates, therefore, we recognize two forms: the squamous, from the squamous cells of the buccal surface, and the tubular, from the antral and nasal mucous membrane. Of these two forms, that from the squamous is far the more frequent.

The squamous type (epithelioma) is primarily a small, circular ulcer with irregular raised edges, or more rarely as a small fungus-like growth upon the alveolar mucous; in either case the indurated edges are characteristic. It is very slow of growth at first, but progresses very rapidly when once its growth is established, due to the fact that at first the cell nutrition is limited; when they reach into the larger lymph spaces and begin infiltration of the capillaries of the submucous connective tissue, their growth becomes rapid. Infiltrating irregularly and rapidly, it destroys the normal mucous membrane, the teeth, the bone substance and finally the skin. Secondary infection of this mass of growing cells and detritus takes place early, and we find a foul, fetid, semifluid discharge thrown off. It is usually at about this time that the pain begins, growing progressively more severe.

The tubular form is an extremely insidious disease, as its primary lesion is within the antral cavity and usually does not make its presence known. The first symptom of its presence is pain in the region below the orbit, a brawniness of the cheek, followed by edema of the tissues of the cheek.

Antral carcinoma is characterized by its soft consistency and exceedingly rapid growth; this latter well illustrated by the following case: A perfectly healthy looking man, aged forty-eight years, presented himself at the hospital dispensary for the relief of epistaxis. Examination showed a new growth of small size, apparently from the antrum, and section was taken for examination, proving it a carcinoma of the tubular type. Patient did not return, however, for three weeks, when second examination disclosed the left lower fossa of the nose completely filled with the growth, as well as most of the lower antral space. He was admitted to hospital, though past operative intervention, and died in six weeks. Histologically it is marked by the fact that infiltration is so gradual that it is impossible to determine where the growth ends and normal tissue begins. This way of infiltration has earned for it the title of "boring cancer."

Carcinoma is distinctly a neoplasm of middle life, scarcely ever occurring before the forty-fifth year. Is painless in its early stages, but later pain is very severe. Metastasis is frequent and glandular involvement constant. Irregular, rapid infiltration into all surrounding tissues is its growth, with ulceration, liquefaction and sloughing resulting from the mass occluding its own blood supply and the constant presence of septic infection.

Cysts of the superior maxillary bone are among the most common of its surgical affections. They develop from the root of a permanent tooth, by the growth of the tooth sack with its contained fluid, the remains of the enamel forming organ. As these tumors may develop long after the tooth has been removed, it is not always possible to establish direct connection between one of these cysts and a particular tooth, but smaller cysts have often been accidentally found directly attached to the tooth root, and as the histology of both are identical, it may safely be assumed that their origin is the same. Buchtmann's theory, that these tumors develop from the ingrowth of buccal mucous membrane along the root of carious teeth, though accepted by many, does not seem to explain their complicated formation so well as that of their development from the epithelial layer of the sheath of Hertwig. These cysts, like the odontomata, may remain within the bone quiescent for years, to be suddenly stimulated to proliferation and tumor formation. Until lately these cysts, especially the multilocular form, were supposed to occur but rarely in the superior maxilla; a fact that Becker explains by the statement that these neoplasms early invade the antrum, where their true nature is less easily recognized, slowly replacing the bone by absorption and pressure, the cyst reaches the surface of the bone, where the external layer may become so thinned as to give a parchment-like crackle on palpation; in most cases, however, the cyst wall, of connective tissue with its epithelial lining, is so heavy that this cannot be noted. Eventually this external layer of bone will be destroyed and there appears on the surface a uniform, painless swelling, with well defined margins, bluish in color and fluctuating with difficulty. Incision of the tumor will release a quantity of fluid and disclose a cavity heavily lined with a membranous wall, into which no tooth elements or bone project.

Of those that invade the antrum, few are recognized in life, though many are found at autopsy. The well known mucocele of the antrum is in most instances an unrecognized maxillary cyst. In this location the developing cyst produces little pressure, hence no pain; and so the patient's attention is not called to its existence until it reaches the surface, where it may show as a cyst swelling over the antrum directly opposite the ala of the nose, or more rarely it may force inward the lateral wall of the nose toward the septum. This bowing-in of the antral wall is a distinguishing point between the cyst and the maxillary sinuitis.

Cysts of the maxilla are most common about the age of thirty, though several have been reported as occurring in childhood, from the developing permanent teeth. Among my own cases, three have developed during pregnancy, and although unnoticed up to that time, grew with such unusual rapidity that they had to be surgically treated during that period.

The mucous membrane over the exposed surface of these growths does not tend to ulceration, nor are there any inflammatory symptoms, except where infection has been secondarily induced by incision or puncture. These neoplasms show exceedingly well in X-ray photographs, while incision is absolutely diagnostic.

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XXXIV.

TRUE MYXOMA OF THE RHINOPHARYNX—REPORT OF TWO CASES.*

By Virginius Dabney, M. D.,

Washington.

It is because of the extreme rarity of a pure myxoma in the rhinopharynx that these cases are reported; indeed, such a tumor is infrequent anywhere in the body, but especially in the postnasal space, where the invasion of fibrous elements in new growths seems the rule. In fact, Adami speaks of the myxomata as tumors composed "in the main" of isolated cells of a stellate or polyhedral appearance, generally showing condensed fibrous tissue or cartilaginous masses. It is the occurrence of these fibrous elements that has led many pathologists to reject the classification of true myxoma, and they speak of myxomatous modification or degeneration of a connective tissue neoplasm. Such differentiation is quite proper and scientifically accurate, but only where this fibrous or cartilaginous constituent is demonstrable. The accompanying sections show that no such element is present in the cases reported, as the capsule is the only fibrous appearance there, and it does not send in any trabeculæ. Unfortunately, only one of the cases furnished sections for photographing, as the patient destroyed the neoplasm after examination, but before the pictures could be made. It was identical in structure with the other, however.

Case 1.—R. G., aged twelve years, healthy girl, daughter of healthy parents, had felt some difficulty in nasal respiration for about two months, and was sure she had never had such difficulty before that time. There was nothing abnormal in the mouth, nose or hypopharynx, but on drawing forward the soft palate, there was seen plainly resting upon it a smooth, grayish tumor, freely movable. Under ether, digital examination showed it to be attached firmly by a broad base to the basilar process, whence it resisted removal by all the usual instruments, unless I was to be content to remove it in part. Finally, a soft rubber catheter was passed into each nostril, the two ends drawn snugly anteriorly and clamped at the nasolabial margin. Thus the growth was straddled, and isolated for manipulation, and the palate drawn forward all at the same time, while the field was absolutely clear of instruments and the hands of any assistant. A large adenoid curette was fitted into the space between the catheters, held firmly there, the beak against the vomer, till the vault was reached, when a sweeping posterior movement removed the mass in toto. It proved to be nearly round, and an inch and three-quarters in diameter. It was a pure myxoma, which is especially remarkable, as the patient was at the age when such neoplasms are prone to fibrous change, even malignant transformation; yet there was no such manifestation. While it does not prove that no recurrence will take place, it is well to state that none has as yet occurred after an interval of ten months.

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*Read before the American Laryngological Association, June 1, 1915

Case 2.—M. F., aged nineteen years, pale, neurotic girl, thought it a year since she first noticed a stoppage of the nose and an irritative cough. Her lungs were normal, and there was no syphilitic or tubercular history to be obtained. While two growths were afterwards found at operation, only one at this time was visible with the mirror, but this was easily seen. The inferior extremity, only on attempted nasal inspiration, rested on the soft palate. She declined to have any operation without a general anesthetic, which was accordingly given and two tumors made out by digital examination: one attached to the basilar process, smaller of the two, heart-shaped, approximately one inch in each direction; the other, clearly felt, was attached to the posterior ethmoid region on the left, two and one-half inches long, three-fourths of an inch broad. Both were divulsed with a large pair of adenoid forceps, apparently without leaving any remains. Apart from the fact of the two tumors being excellent specimens of true myxomata, additional interest is lent to the absence of any fibrous structure by the history of another growth, described by the patient as identical, which was removed eleven years before. That she should have had no recurrence of some tumor showing a connective tissue origin, and that the two which did return, for they must have been recurrences, likewise showed a pure myxomatous structure, is, I think, worthy of record, especially, as remarked of the previous case, because the tumor formation covered a period in which tissue change is usually marked, that of puberty and early adolescence. It is too early to make any prediction as to recurrence, inasmuch as the removal was accomplished only five months ago.

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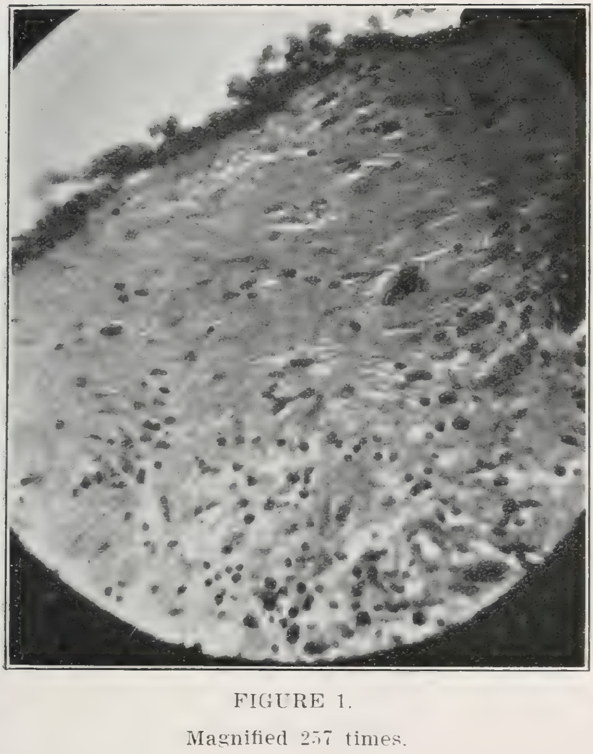

FIGURE 1.

Magnified 257 times.

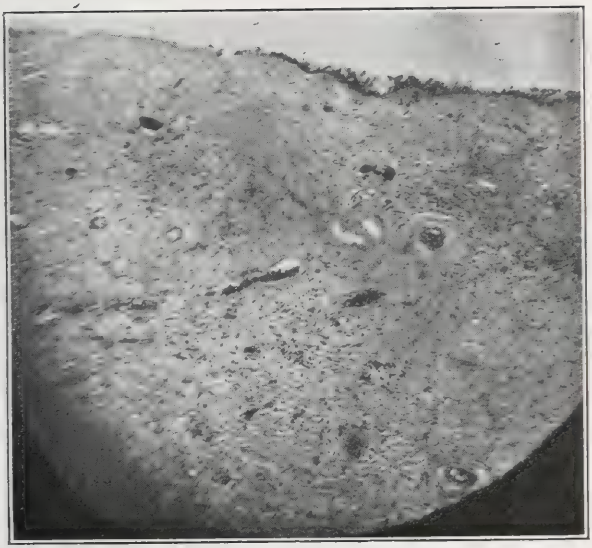

FIGURE 2.

Magnified 60 times.

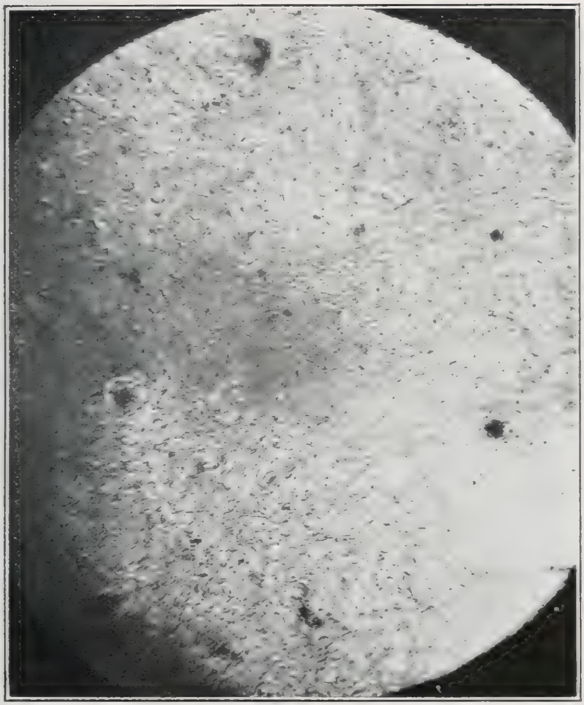

FIGURE 3.

Magnified 60 times.

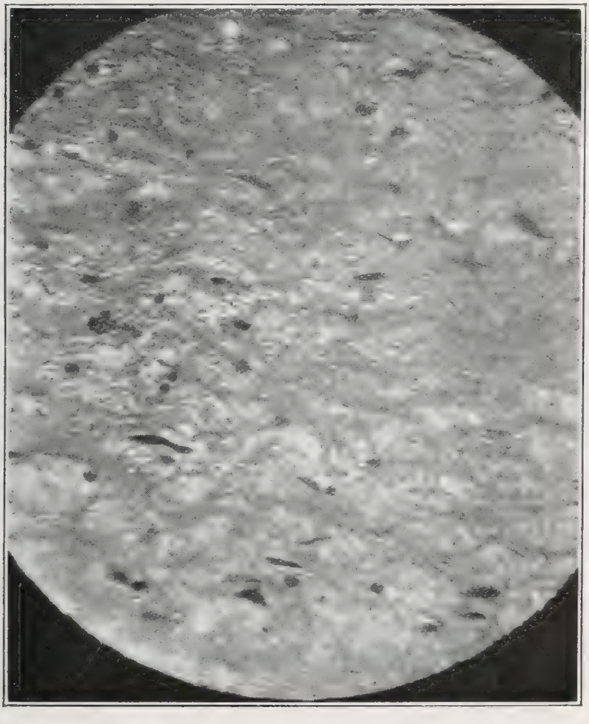

FIGURE 4.

Magnified 257 times.

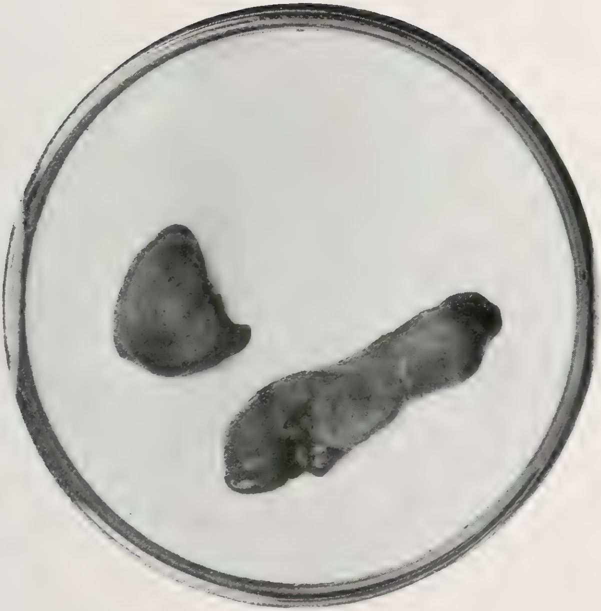

FIGURE 5.

Reproduction a little smaller than life.

XXXV.

REPORT OF TWO CASES OF MASTOID ABSCESS, INFECTIVE THROMBOSIS OF THE LATERAL SINUS AND JUGULAR VEIN—RESECTION OF THE JUGULAR—RECOVERY.*

By J. H. Bryan, M. D.,

Washington.

While the first case was rather typical in character, it nevertheless presents some unusual features which justify its being placed on record. Case two, on the other hand, presents many difficulties, and is brought before the society with the hope that the discussion will bring out some suggestions as to the best manner to manage those cases where the infected clot remains in the bulb, as in this case, where one time it seemed almost impossible to dislodge it without the radical destruction of the bone through which the lateral sinus passes into the neck. I believe it was the presence of this clot which was the source of the continued systemic infection.

Case 1.—Acute suppurating mastoiditis, perisinus abscess, infective thrombosis of the lateral sinus and jugular vein; resection of the jugular; streptococcus infection.

I saw this case, a girl thirteen years of age, on the evening of January 25, 1914. She had been ill for two days with a marked attack of influenza. The ear became almost immediately involved, accompanied by intense pain, and the membrane ruptured spontaneously during the course of the first twenty-four hours. When I first saw her she looked ill, the temperature was 104°, the left ear was discharging profusely—pus mixed with blood. She was complaining of intense pain in the ear, and there was marked tenderness over the mastoid tip.

Examination of the ear showed an intensely inflamed membrane with a perforation in the lower posterior quadrant, through which a bloody purulent secretion was flowing freely.

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*Read before the American Otological Society at its Forty-eighth Annual Meeting, at Niagara Falls, June 4, 1915.

Hot boracic acid irrigations were ordered hourly during the night.

January 25th. The patient was removed to the Episcopal Eye, Ear and Throat Hospital at ten o'clock this morning. On admission her temperature was 103.4°; at noon, 104.4°; dropping slowly to 102.8° at 8 p. m. As the child was attending a boarding school in Washington, and her parents were living some distance from the city, there was some delay in reaching them to obtain their permission for an operation.

January 26th. Today the temperature ranged from 102° to 103°. While the pain in the ear was greatly relieved by the hot douches, she was extremely restless and dull.

January 27th. At 8 a. m. temperature was 99.8°. At 10 a. m. she had a severe chill, following which her temperature advanced to 105°. Permission for an operation having been obtained, a simple mastoid operation was done at 2 p. m. After opening the mastoid it was found to be already very badly affected and the antrum filled with pus. The whole of the outer wall was removed down to and including the tip of the process, and everything in the way of diseased bone was thoroughly removed with the curette. The sinus wall was exposed, carefully examined, and found to be in good condition, and as there was no reason to suspect sinus infection, it was not opened. The wound was dressed in the usual manner and the patient returned to her room. The temperature after the operation, at 4 and at 8 p. m. was 102°.

January 28th. The patient this morning had a very septic appearance. Temperature at 8 a. m., 103°; at 12 noon, 99.4°. She had a severe chill about this time, and the temperature rose to 103.2° at 4 p. m.

January 29th. At 8 a. m., temperature 104.2°; at 12 noon, 104.2°. Owing to the continuous high temperature, it was decided to explore the wound farther. In consultation with Dr. C. W. Richardson, who assisted me in the operation, the dressings were removed and the mastoid wound was found to be in a healthy condition. The wall of the lateral sinus was completely removed from the knee to the bulb. At the latter point a large perisinus abscess was located. After thoroughly removing the pus and some granulations the sinus itself was opened to its full extent from the knee to the bulb and found filled with a firm clot. This was removed with the curette as far as the knee and well back toward the torcular, when a sharp flow of blood followed which was controlled by compression. The curette was then passed down toward the bulb, and as there was no return flow of blood from this end of the vein, we decided to remove the jugular. After packing the upper end of the lateral sinus with an iodoform gauze plug, an incision was made along the anterior border of the sternomastoid muscle, extending from just below the mastoid tip to near the clavicle. The vein, exposed, was found to present a firm, cord-like feeling. After ligating the vein at its upper and lower ends, its collateral branches were then ligated, and about two and one-half inches of the jugular were removed. A gauze drain was then placed in the upper and lower ends of the wound, which was closed by means of interrupted sutures. The mastoid dressings were then applied and both wounds enveloped in a bandage. The patient reacted well after operation. The temperature at 4 p. m. was 101.4°. The pathologist reported he found streptococci in the clots removed from the lateral sinus and the jugular vein.

January 31st. The patient since the operation has been doing well, although the temperature is markedly septic in character, and ranges from 99.2° to 104.2°. The mastoid and neck wounds were dressed today and found in good condition. The gauze compress at the upper end of the lateral sinus was not removed, but the gauze wicks in the upper and lower ends of the neck wound were removed, and some pus was found in the upper end of the wound, which was removed by gentle irrigation. The gauze drains were reinserted in the neck wound and the mastoid dressings reapplied.

February 1st. The patient seemed much better during the early part of the day, but at 4 p. m. she had a severe chill, followed by a rapid rise of temperature to 104.2°. She was given ten cubic centimeters of antistreptococcus serum in the lumbar region. Following the injection the temperature became lower, ranging from 98° to 100.4° during the two following days; but owing to the continued high leucocyte count she was given a second injection of ten cubic centimeters of antistreptococcus serum on the afternoon of February 2d.

February 3d. Wounds redressed. Mastoid wound looking healthy. Gauze compress removed from the upper end of the lateral sinus, and as no blood followed its removal it was not renewed. Pus found in the upper and lower ends of the neck wound after the removal of the drains. Both ends irrigated with a saturated solution of boric acid. Firm union of the edges of the wound having taken place, the stitches were removed, the gauze drains reinserted, and the mastoid dressings reapplied. The temperature during the night of the 3d and the forenoon of the 4th ranged from 102° to 102.2°. On the afternoon of the 4th she was given twenty cubic centimeters of the serum, and following this last injection her temperature dropped to 99.2°. From this time on the temperature became normal and remained so during the rest of her convalescence. The wounds, both the mastoid and that in the neck, progressed favorably, and she was soon placed on the convalescent list. The scar in the neck for a long time remained quite insignificant, but about two months after leaving the hospital it presented quite a broad, ribbon-like appearance and was very red. I am glad to say, however, that within the last six months this has disappeared and the scar is insignificant. The following is a tabulated statement of the blood counts and bacteriologic examination:

January 25th, on admission to the hospital, leucocytes, 14,400; aural pus smears showed the presence of many cocci, mostly in pairs like pneumococci, and a few in chains, like streptococci.

January 26th. Leucocytes, 11,600. Culture made from aural pus yesterday yields growth of streptococci.

January 28th. Leucocytes, 17,300.
January 30th. Leucocytes, 12,100.
January 31st. Leucocytes, 15,800.
February 2d. Leucocytes, 16,100.
February 4th. Leucocytes, 14,100.
February 6th. Leucocytes, 8,200.

Differential count (200 counted):

Small lymphocytes	14 per cent
Large lymphocytes	3 per cent
Polymorphonuclears	83 per cent
Total	100 per cent

This case presents some interesting features, among which may be mentioned the desirability or not of exposing the lateral sinus in primary mastoid operations. In the primary operation of this case the mastoid was thoroughly cleaned out, and the bony wall covering the sinus seemed to be in a healthy state, so it was not deemed advisable to remove it. These cases, however, are very deceptive, and notwithstanding the healthy appearance of the sinus wall, there may be a nidus of diseased bone which escapes detection and from which an infection of the sinus may take place. The infection in this case took place from the perisinus abscess near the bulb, which was not detected at the time of the first operation.

Case 2.—Acute suppurative mastoiditis, infective thrombosis of the lateral sinus and jugular vein; resection of the jugular, metastatic abscess in the leg; staphylococcus pyogenes infection.

I saw this child, Harriett H., aged seven years, on the evening of December 22, 1914, in consultation with her family physician, who stated that she had been ill with influenza for several days, and two days ago she complained of intense pain in the right ear. A paracentesis was done by another aurist at this time. When I saw the patient at 11:30 p. m. her temperature was 101.2°, very restless, and complaining of intense pain in the ear. An examination of the ear showed the canal filled with a thick, purulent secretion, which, when wiped away, enabled me to see the drum, which was intensely swollen and red. The perforation was in the posterior quadrant, and seemed sufficiently large to admit of free drainage. There was no sagging of the posterior wall of the canal, but there was some tenderness over the mastoid. How much of this was real and how much was due to the general irritability of the child, I was unable to state. The ear was ordered douched hourly with a hot saturated solution of boracic acid. The pain was soon relieved, and she slept through the night, having to be awakened at the stated intervals for the douching.

December 23d. Today she seemed quite comfortable, not complaining of pain except when the mastoid was pressed on firmly. The temperature at 8 a. m. was 98.4°; 12 noon and 4 and 8 p. m., 98°. At 11 p. m. it suddenly rose to 101.4°. The ear appeared to be draining well.

December 24th. The general conditions were about the same. The low morning temperature was 98°, and the highest in the evening 101.8°.

December 25th. At 4 a. m. she was very restless and the thermometer showed her temperature had risen to 103°. At 8 a. m. it was 102° ; at 12 noon, 100.8°. There was a decided change for the worse in the appearance of the child, and a decided tenderness over the mastoid. She was immediately taken to the Episcopal Eye, Ear and Throat Hospital, and at 2:30 p. m. a simple mastoid operation was done. The mastoid was found already badly affected, pus in the antrum, and some soft diseased bone extending through the process down to the tip; pus in considerable quantity was evacuated between the membranous and bony wall of the auditory canal where the anterior flap was well pushed forward. The mastoid process was completely exenterated down to and including the tip. The bony wall covering the lateral sinus was carefully examined, and a portion of the wall, about an eighth of an inch, was removed at about the middle of the sinus, exposing the vein, which had a healthy appearance to the eye and also on palpation. At this time it did not appear that the sinus was involved, so the usual dressings were applied and the patient returned to her room in good condition. Evening temperature at 6:45, 100° ; 12 midnight, 99.2°.

December 26th. Temperature: 9 a. m., 101.4° ; 12 noon, 101° ; 4 p. m., 101.2° ; 8 p. m., 102°.

December 28th. The temperature continued to rise and fall during the past two days, showing a decided septic character. Otherwise the patient seemed to be doing as well as she could at this stage.

December 29th. Temperature: 1 a. m., 103.6° ; 8 a. m., 99.4° ; 12 noon, 98.2° ; 4 p. m., 98° ; 8 p. m., 98°.

December 30th. The temperature remained low today, ranging from 98° to 98.8°. The wound was dressed at 1:30 p. m. Little or no secretion found on the dressings, and the wound itself presented a very dry and glazed appearance.

January 1st. The temperature continued to pursue an irregular course; 8 a. m., 100.8° ; 12 noon, 99° ; 4 p. m., 100.4°. Wound dressed again, and presented a healthier appearance in that the tissue did not present such a dry condition. Dressings somewhat moist. Temperature, 8 p. m., 104°.

January 5th. Temperature: 8 a. m., 100.8° ; 12 noon, 99° ; 4 p. m., 99.2° ; 8 p. m., 98°.

January 6th. The general condition of the patient remained about the same. Temperature, 8 a. m., 100.4° ; 12 noon, 99.6° ; 4 p. m., 100.2° ; 8 p. m., 104°. The wound was dressed again today, and its general appearance was satisfactory; granulations forming, and healthy in character.

January 8th. Temperature: 8 a. m., 100° ; 12 noon, 99.8° ; 4 p. m., 100.4° : 8 p. m., 103°, and at 11 p. m. it had risen to 105°.

January 9th. The patient passed a very restless night, and the earliest recorded temperature this morning, owing to the child being asleep, was 97.6° at 11 a. m., 97° at 12 noon. She complained several times during the night of being chilly, following which the extremities and face were quite moist. Dr. William B. Mason saw the case in consultation and assisted me in the operation at 1:30 p. m. Under ether anesthesia the mastoid wound was thoroughly explored and all granulation tissue removed with the curette. The bone covering the lateral sinus was removed, exposing the sinus for some distance over the transverse sinus posteriorly and down to the bulb. At the junction of the lateral and sigmoid sinus the vein showed a dark grayish appearance, extending back toward the torcular; from the point of exposure at the time of the original operation to the bulb, the vein presented a different appearance, being quite blue and soft to the touch. The vein was then opened and found thrombosed, and it was then freely opened from an inch behind the sigmoid bend to the bulb, and a firm clot was removed with the curette. As no return flow of blood occurred, the curette was passed well back toward the torcular, and fragments of clot removed until a free flow of blood was obtained. The transverse sinus was then blocked off with an iodoform gauze tampon. The lateral sinus was then gently curetted as far as the bulb, until all the clot that could be reached was removed. As there was no flow of blood, an incision was made along the anterior border of the sternocleido mastoid muscle, extending from just below the mastoid process to within an inch of the clavicle, and the jugular vein was exposed. After separating it from its sheath, two ligatures were passed around it and tied. The thyroid and facial veins were ligated, and about two and one-half inches of the jugular were removed. The wound in the neck was not closed, but packed with iodoform gauze, and a small gauze wick was passed into the sinus end of the bulb as far as possible, and the usual mastoid dressings applied. The child's condition at the time of and during the operation was very critical, the pulse being 148 and the respiration 30. Although she lost very little blood, she was very weak. Dr. Blair Spencer, her family physician, gave her strychnin sulphat, grain one-sixtieth, hypodermically, and administered seven hundred cubic centimeters normal salt solution through the median cephalic vein, after which she rallied and was in fair condition when returned to her room. The operation lasted a little over one hour. The jugular vein, when opened, was found to be filled to its full extent with a solid clot. A culture made from the clots taken from the lateral sinus, the jugular vein and from the blood removed from the vein in the arm all yielded staphylococcus pyogenes. A vaccine of 500,000,000 was prepared from the various strains.

January 10th. She passed a very restless night, but there was a marked improvement in the quality of her pulse, which at 8 a. m. was 108; temperature, 99°; 12 noon, temperature, 99.2°, pulse 102; 4 p. m., temperature 98.4°, pulse 108; 8 p. m., temperature 100.6°, pulse 100.

January 11th. At 3 a. m. the temperature rose to 103.4°, but gradually dropped, ranging from 98.4° to 100.2°.

January 13th. The patient has been gaining in strength during the last forty-eight hours, and the temperature during this period has remained low, ranging from 98.4° to 99.2°. The wound was dressed at noon, the packing at the knee was not disturbed, but the gauze from the mastoid and neck wounds was removed and the parts looked healthy. No pus was found in the wounds, but by gently pressing upward from the neck pus flowed freely into the mastoid from the bulb. Temperature, 6 p. m., 98.2°; complained of feeling chilly. Temperature, 7 p. m., 104°.

January 14th. Temperature: 8 a. m., 100.4°; 12 noon, 101.4°; 4 p. m., 101.4°; 8 p. m., 103.6°. Wound dressed at noon; pus still flowing from the mastoid end of the bulb on gentle pressure on the neck. Gentle irrigation with a small syringe through the mastoid end of the bulb brings away small clots of foul-smelling pus. At 4 p. m., one-half cubic centimeter autogenous vaccine was administered in the arm.

January 18th. During the past three days the patient's condition remained about the same, the temperature assuming the general septic character. Early morning temperature today, 98° ; 12 noon, 103.8° ; wound dressed at 2 p. m., both neck and mastoid wounds granulating. The ligature at the distal end of the jugular having sloughed off, a small canula was inserted in the vein, and with gentle irrigation a partially broken down and foul smelling clot, mixed with pus, was washed out of the mastoid end of the bulb. A gauze wick was introduced into the mastoid end of the bulb and the dressings reapplied. Twelve minims of vaccine given in the arm at 4 p. m.; temperature, 104.2°. At 8 p. m. the temperature was 103.4°. The wounds were dressed every second day, owing to the difficulty in draining the bulb, which continued to secrete pus in considerable quantities. Notwithstanding the septic temperature the patient was running, she continued to gain in strength.

January 20th. Twenty minims of vaccine were administered in the arm. The temperature continues irregular.

February 4th. For several days past the child has complained of a pain in the left leg. An examination showed a decided red spot about the size of a fifty-cent piece on the outer side of the left leg, which was tender and fluctuated on pressure. She was taken to the operating room, and under ether the mastoid and neck wounds were dressed. Pus had practically ceased to form in and around the bulb, both wounds granulating rapidly. A free incision was then made over the swelling on the left leg, and a large quantity of thick, greenish pus, which had burrowed down between the muscles of the leg, was evacuated. The abscess sac was thoroughly curetted and the wound packed with iodoform gauze. The temperature, which had been practically normal for several days, suddenly rose at 6 p. m. to 103.4°. This dropped gradually during the night, and at 8 a. m. on the morning of February 5th was 98.2°. From this time on the temperature gradually became normal. The wounds in the mastoid region, the neck and the leg granulated rapidly, and the child's convalescence was uninterrupted and she was discharged from the hospital on February 12th. The subsequent dressings were done at the house and at my office.

The temperature charts are very characteristic in these cases. In Case 1 the ordinary stock streptococcus serum was used. In Case 2 a vaccine of 500,000,000 was prepared from various strains made from a culture obtained from the blood taken from the patient's arm and from the clots of the lateral sinus and jugular vein.

January 14th. One-twentieth cubic centimeter, or about 25,000,000, were injected into the patient's arm.

January 16th. Twelve minims were injected into the right thigh.

January 20th. Twenty minims were injected into the left thigh.

As there was no appreciable influence on the temperature, no further injections of the vaccine were given.

The leucocyte counts were as follows:

December 25th, 13,000.
January 3rd, 16,400.
January 5th, 13,100.
January 8th, 12,000.
January 17th, 11,000.
January 18th. 12,000.

Relative number of leucocytes.	Per Cent.	Number Counted.
Small lymphocytes	26.0	65
Large lymphocytes Large mononuclears	7.6	19
Polymorphonuclears	66.4	166
	100.00	250

All of the bacteriologic work and blood counts in these cases were done by Dr. J. B. Nichols, the pathologist of the hospital.

While the infection in Case 1 was of a more virulent type, it did not present the same difficulties as were met with in Case 2.

An interesting point in Case 2 is that in the original operation the sinus wall was exposed from just below the knee to near the bulb, and about an eighth of an inch removed, exposing the sinus, which at this time did not appear to be affected. On January 9th, when the sinus was thoroughly exposed, it was found solidly thrombosed from near the torcular to and involving the jugular vein to its full extent. The point of infection apparently was at the knee, although there was no diseased bone in this vicinity. The infection must have taken place through some of the smaller veins rather than from any direct contact of septic matter with the sinus itself. The greatest difficulty we met with in the management of this case was in relieving the bulb of the septic clot, and its resulting perisinus inflammation. It was the prolonged suppuration in this region which caused the continued general septic condition.

It is the bulb complication that causes so much trouble in the management of these thrombosis cases. While I removed the bone covering the sinus as far down as the point where it bends, it was not sufficient to bring about complete drainage, and it was only by the most persistent and constant cleansing of these parts that I was able finally to overcome the suppurating condition.

Fortunately, both of these cases were brought to a successful termination, notwithstanding that a marked general septic condition was present before the source of infection was shut off from the general circulation.

How much the vaccine therapy had to do with the subsidence of the septicemia is a question. In the first case I believe the antistreptococcus serum had a beneficial effect, but in the second case I doubt whether the autogenous vaccine had any effect at all upon the general systemic poisoning.

XXXVI.

CASES OF LATERAL SINUS THROMBOSIS.*

By George W. Boot, M. D.,

Chicago.

Case 1.—Turbinectomy, acute suppurative otitis media, mastoiditis, sinus thrombosis, pyemic abscess. Recovery. D. T., American; single; aged eighteen years; laborer. Admitted to Cook County Hospital May 25, 1914, on the service of Dr. Friedberg.

History.—One month ago patient was operated on at a dispensary for enlarged turbinates. He used a nose wash which he snuffed up his nose. A few days later he complained of pain in the right ear. This was soon followed by a discharge from the ear. The ear has been running ever since, and the pain continued until the evening before he was admitted to the hospital. At this time patient became feverish and felt sick. He has had no chill, nausea or vomiting.

Previous History.—He has always been well.

Family History.—Father alive and well. Mother dead of unknown cause. Two brothers and one sister alive and well.

Habits.—Does not drink or smoke. Venereal history negative.

Examination.—Patient appears to be quite sick.

Eyes.—Pupils equal and react to light.

Ears.—There is a purulent discharge from the right ear. There is extreme tenderness in the region below the right auricle and over the tip and lower portion of the right mastoid. There is no redness or swelling over the mastoid.

Mouth and throat negative. Temperature 104.2° ; pulse 128; respiration 24. Blood examination, 20,100 whites.

Operation.—A mastoid operation was done the same afternoon by Dr. Friedberg. I find the following notes concerning the operation:

The bone harder than usual and congested. Cells free from pus, except one small one found near the antrum. Lateral sinus exposed and to all appearances normal. A small drain inserted and wound closed.

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*Read before the Chicago Laryngological and Otological Society, March 16, 1915.

POSTOPERATIVE HISTORY.

May 27th. 7:15 a. m., patient had a severe chill lasting ten minutes. 8:10 a. m., temperature 104.4°; pulse 128; respirations 28. Slight discharge from the wound. Profuse discharge from the canal. Tongue heavily coated. No rigidity of neck. Blood examination, 11,500 whites.

May 28th. Temperature has been irregularly high since yesterday. Blood examination, 12,900 whites. Blood culture negative.

May 29th. Temperature still irregular. Blood examination, 14,000 whites. The temperature continued irregular until June 3d, when, in Dr. Friedberg's absence, I reopened the mastoid, exposed and opened the lateral sinus. A thrombus was removed after evacuating pus. Free bleeding was obtained from the upper portion of the sinus but not from the lower. The upper end was tamponed with iodoform gauze, a drain inserted and the wound dressed. Following this operation the patient stated that he felt well. His temperature did not remain normal, though it fell to normal at times.

June 6th. Complains of pain in the right shoulder. Temperature 102.8°.

June 7th. 11:45 a. m., severe chill. Temperature 97°; pulse 116; respirations 26. 12:30 p. m., temperature 104.2°.

June 9th. 3:00 a. m., slight chill. Temperature 100°. 5:00 a. m., intense pain in shoulder, arms and hips.

June 11th. Blood examination, 20,080 whites.

Operation.—The right jugular vein was exposed and opened, liberating about three drams of pus. The opening in the vein was just at the level of the occluding thrombus, which was not disturbed. The vein was not ligated. A small rubber drain was passed upwards inside the vein as far as the temporal bone.

June 12th. Tenderness and swelling over the left great trochanter.

June 24th. Abscess over the left great trochanter opened and about a pint of pus evacuated.

June 28th. Wound in neck closed. Mastoid wound closing. Wound in thigh healing rapidly. No pus. General condition good. Discharged.

This case shows what a serious condition may develop following turbinectomy and probably improper cleansing of the nose. It also shows what a severe amount of trouble may occur in a case where there is apparently but slight infection in the mastoid, as shown by the single mastoid cell found containing pus at the first operation. I regret in this case that I did not ligate the jugular vein at the time of the sinus operation. I feel that had this been done the patient would have been saved a good deal of risk; that he would not have had the large abscess over the trochanter, and that he would have recovered promptly instead of becoming very much emaciated before his final recovery.

CASE 2.—SCARLET FEVER, ACUTE SUPPURATIVE OTITIS MEDIA, MASTOIDITIS, SINUS THROMBOSIS. HEMORRHAGE. DEATH. I. K., male, aged four years; Jewish-American. Admitted to Cook County Hospital May 8, 1914, with scarlet fever. Was given one thousand units of antitoxin.

May 10th. Body very itchy Uticaria lotion applied.

May 11th. Ten thousand units of antitoxin given. Culture negative for diphtheria. 10:30 a. m., five thousand units of antitoxin given.

May 12th. 8:00 a. m., ten thousand units of antitoxin given. 10:00 p. m., five thousand units of antitoxin given.

May 13th. Ten thousand units of antitoxin given.

May 14th. Ears began to discharge today.

May 19th. Ten thousand units of antitoxin given. The large amount of antitoxin given, fifty-five thousand units, in spite of the negative cultures, was for the reason that the whole interior of the nose was filled with false membrane and the case appeared as a severe case of nasal diphtheria.

May 30th. Simple mastoid operation done on the left side. As soon as the periosteum was incised, pus was revealed. The mastoid cells were cleaned out and a gauze drain inserted. Duration of anesthesia, twenty-five minutes.

June 9th. 11:30 a. m., temperature 94.6°, pulse 84, respiration 18.

June 10th. 1:30 a. m., temperature 95.6°; shivers frequently. 5 p. m., temperature 105.6°, pulse 160, respiration 48. Wound reopened because of a variation in temperature of eleven degrees in a few hours. Sinus exposed, opened and thrombus removed. Free bleeding was secured from each end of the sinus. Tampon of iodoform gauze. Ether anesthesia of thirty minutes. Examination of the urine today showed hyalin, granular and epithelial casts and a trace of albumin.

June 11th. Temperature 104.8°, pulse 160, respiration 36.

June 12th. Patient managed to tear off all the dressings and following this had a profuse hemorrhage from the sinus. Fortunately the interne caught him before he was completely exsanguinated and repacked the sinus.

June 13th. On changing the dressings today there was profuse bleeding.

June 14th. Patient again removed the dressings and had considerable bleeding. Wound again repacked by the interne.

June 16th. Patient died about 2:00 p. m.

This patient died of toxemia from the scarlet fever, although this was doubtless assisted by the loss of blood which occurred at the time when he tore off his dressings, and in all probability the large amount of antitoxin which he had taken contributed to the fatal result.

CASE 3.—PNEUMONIA, ACUTE SUPPURATIVE OTITIS MEDIA, MASTOIDITIS, SINUS THROMBOSIS. RECOVERY. I. W., female, aged three years, six months. German-American. Family history negative.

Previous History.—Child was well until five weeks ago, when she had an attack of pneumonia from which she made a good recovery.

Present Illness.—Two weeks ago she was taken with a severe pain in the right ear. The drum membrane ruptured spontaneously and the pain became easier. The discharge stopped after one day. Five days later a swelling appeared behind the ear. Patient was admitted to the Children's Memorial Hospital May 27, 1914, with a temperature of 105°. The right canal was wet with pus and there was some redness and tenderness over the right mastoid, otherwise the examination was negative.

May 28th. Throat culture negative for diphtheria.

May 29th. Temperature 102°.

May 30th. 8 a. m., temperature 100.8°. 12:10 p. m., mastoid operation. After the usual preparation the mastoid cells were cleaned out and the lateral sinus exposed. It was found to be eroded and thrombosed. Mucopus was found around the sinus. Free bleeding was secured from the upper portion of the sinus but not from the lower. The upper portion was closed by a tampon of gauze and a drain inserted.

June 2d. Temperature 106°. Very fretful. Often cries out. No rigidity of neck. No spasticity or rigidity of extremities. No Babinski or Kernig.

June 6th. Temperature was continued irregular.

June 8th. Jugular vein exposed and found filled with an organized thrombus. From this time on her temperature gradually improved until June 24th, when she was found to have diphtheria and was transferred to the isolation ward, from which she was discharged July 18th, completely recovered.

The condition in the sinus in this case was very similar to the condition found in Case 1, but fortunately for her the thrombus in the jugular bulb and vein became organized instead of breaking down into pus, and there were no pyemic abscesses.

CASE 4.—CHRONIC SUPPURATIVE OTITIS MEDIA, MASTOIDITIS, FACIAL PARALYSIS, ERYSIPELAS. Russian, laborer, aged twenty-one years. Admitted to Cook County Hospital December 7, 1914. The history as obtained through an interpreter is as follows: Four weeks ago trouble began as diffuse pain over the left parietal region. Pain was dull and heavy. Three weeks ago had pain over face, especially lower part. There is loss of hearing in left ear for spoken voice and watch. Patient says that he had no pus coming from ear. Muscles of neck somewhat rigid and sore. Throat not sore. No other history obtainable. Speaks poor English. Voice slightly hoarse.

Past History.—Thinks he had previous sore throat. No other illness. Family history negative. Denies lues.

Physical Condition.—Tenderness quite marked over mastoid and occipitotemporal region. No signs of local inflammation. No palpable masses or fluctuation.

Ears: External right ear not swollen. Tender and painful on movement. No pus from external meatus. Drum looks thickened and congested. Left ear not affected.

Neck: Muscles rigid, especially posterior cervical. Glandular enlargement marked.

Eyes: Negative.

Face: Complete seventh nerve paralysis on right side, including eyelids and forehead.

Mouth: Negative.

Throat: Slight chronic pharyngitis.

Chest: Negative.

Heart: No thrills or murmurs.

Lungs: Negative.

Abdomen: Negative.

Extremities: Negative.

Diagnosis: Chronic suppurative otitis media with mastoiditis and facial paralysis.

December 12, 1914. Operation, lasting one hour and thirty minutes. The usual incision was made behind the right auricle. The outer wall of the mastoid was found to be of ivory hardness and about four or five millimeters thick. When this was removed a large cavity was found, about 1x1x1.5. The knee of the sigmoid sinus projected into this cavity. When the cavity was cleaned out it was found that in its floor were two sequestra which must have reached almost to the labyrinth.

The usual plastic was done on the membranous canal and the wound closed.

December 16th. Patient is able to close right eye.

December 16th. 8 p. m., the dressings were changed throughout. Temperature 102.4° this morning. 8 p. m., right side of face swollen. Temperature 104.2°. 9 p. m., right side of face swollen, red, elevated, with sharply defined margins. Redness extends over nose and is beginning to surround left eye. Erysipelas.

December 18th. Left side of face clearing up; right side shows spreading of erythema.

December 21st. Erysipelas of face clearing up. Right sided facial paralysis clearing up. Blood cultures negative. Twenty-eight thousand leucocytes.

December 22d. Temperature normal from 4 a. m. to about noon, when it was found to be 103.6°. Patient had been chilly for a day or two at intervals. With the facial erysipelas clearing up rapidly, the chill and temperature caused me to suspect a sinus thrombosis. Accordingly, he was anesthetized and the bone removed still farther from over the sinus, with the intention of exploring the same. In removing a piece of bone with the biting forceps a small splinter penetrated the sinus and free bleeding occurred, putting an end to my suspicions of thrombosis. The sinus walls were softened and covered with granulations. The sinus was tamponed and the wound packed.

December 26th. Red, elevated, clearly demarcated area upon back of neck, shoulders and upper half of back. Erysipelas recurrens.

December 28th. Redness extends to level of eleventh dorsal vertebra with sharp margin, clearing in upper part. All dressings in ear changed.

December 29th. Erysipelatous area extends further down back, also upon front of chest and left arm. Fading in old areas.

December 31. Erysipelatous area has extended to lumbar region, below nipple line and below elbow.

January 8th. Erysipelatous eruption has wholly disappeared. Temperature normal.

I reported this case to show the difficulties which may occur at times in the diagnosis of a sinus thrombosis. This patient had a streptococcus infection, causing erysipelas, but the streptococcus, we know, frequently causes sinus thrombosis. There seemed to be fully as much chance that a sinus thrombosis was occurring as that an erysipelas was recurring, and knowing the virulence of streptococcus infection about the ear, I proceeded to explore the sinus without waiting; had I waited another twenty-four hours, I probably would not have operated on the sinus.

In cases 1 and 3 I was not able to get free bleeding from the lower extremity of the sinus—that is, from the jugular bulb. Under similar circumstances in the future I expect to ligate the jugular vein. It seems to me the small amount of danger to the patient is fully offset by the lessened risk of pyemia, and I am sure that I shall have much less anxiety about these cases if I know that the vein is ligated and severed. Case 3, of course, shows that under these circumstances the thrombus can be organized, but all the while this thrombosis was organizing the patient was running a septic temperature, and I was not certain until the jugular vein was exposed and found it was not filled with pus as was Case 1.

XXXVII.

REPORT OF A CASE OF BRAIN ABSCESS WITH UNUSUAL FINDINGS.*

By George L. Richards, M. D.,

Fall River, Mass.

The following case of brain abscess seems of sufficient interest to report, even though it was an unsuccessful one. I have the feeling that the statistics of brain abscess as published are better than the facts really warrant, since many of us hesitate to report and put on record our unsuccessful cases.

The patient, a Swede, carpenter by occupation, and twenty-four years of age, was admitted to the Union Hospital in Fall River on the evening of April 14, 1915. The family history was negative, but he said he had been sick several years ago with hemorrhages of the lung but had recovered. The only thing in the immediate previous history of moment was the fact that he had two or three fingers bound up as the result of a scratch or injury in his work, and on examination similar sores were found on other parts of the body. He stated that a small wound of the hand or elsewhere healed rather slowly.

Present History.—Three weeks ago he had some trouble with his right ear. He consulted a physician, who incised the drum. This gave relief for a short time, but the pain returned, accompanied with sudden and severe headaches. A physician was called, who treated him for a few days for these same symptoms. In addition there was some nausea but no vomiting. There being no improvement and his mental condition becoming somewhat sluggish, he was sent to the hospital, where, owing to my absence from the city, he was first seen by another member of the staff, who incised the drum with some relief. At this time there was only slight pain in the ear, and no mastoid tenderness. I saw him for the first time the morning after he came to the hospital, April 15th, when the drum incision had almost entirely closed except one small point, and I reincised it. He complained of no pain on pressure, and there was very little discharge after the drum incision. Pulse fifty-six to sixty, temperature ninety-nine degrees, respiration about twenty-four. Mental condition a bit sluggish, but answered questions fairly well, although never giving a good account of his previous illness. It was impossible to find out from him just when the drum was first incised or any clear account of the initial symptoms. His principal complaint was of severe headache, rather frontal in character, relieved somewhat by the ice bag, and this headache never entirely ceased. He was in bed with the ice bag over his head, eyes closed, apparently stupid, but would rouse to answer any questions. There was no muscular rigidity or paralysis, the reflexes were all present but slightly sluggish, and there was no nystagmus. An ophthalmoscopic examination of the right eye showed a choked disc of about three diopters.

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*Read before the American Otological Society at its Forty-eighth Annual Meeting, at Niagara Falls, June 4, 1915.

April 16th there was only a slight discharge from the ear, but several hours would elapse before the small wick placed in the external canal was wet through. An X-ray picture was taken and a diagnosis returned of infiltration in the region of the right mastoid, probably extending well up into the middle fossa. The pulse dropped lower and ranged all the way from forty-five to fifty-eight. He asked for the ice bag constantly, and lay in a rather stuporous condition, but said he was all right and would be as well as ever in a few days if let alone. Later, on the evening of this day, the symptoms seemed to grow worse, the temperature went up to about one hundred, and the diagnosis of brain abscess in temporosphenoidal lobe seemed to be plainly warranted, even in the absence of any paralysis, so he was made ready for operation. On entering the operating room, however, he refused to be operated upon, and every effort to gain his consent failed. He maintained that he was twenty-one years of age, his own boss, and that we had no right to do anything to him. If we would only let him alone he would be all right. He would fool us all yet, and be all right in the morning. He was therefore returned to the ward.

April 17th, the third day after admission, the pulse was forty, temperature normal, and the respiration twenty-four.

The choked disc had increased to almost five diopters, the cerebration was more sluggish, reflexes less active, and the ears discharging very little. He was still complaining of severe frontal headaches, but there was no pain over the mastoid. A telegram was sent to the patient's father. He arrived the following morning, and after much difficulty obtained consent for operation, which was done at three o'clock in the afternoon of the same day. He took ether rather slowly, requiring three-quarters of an hour, but was easily kept under once it was attained.

The usual operation for an acute mastoid was first performed. There were a few soft cells and a drop or two of pus in the region of the antrum, but no general breaking down of the mastoid cells. The antrum was rather higher and deeper than usual, a millimeter or two above the spine. No apparent cause for his symptoms having yet been found, the incision was extended upwards and forwards and the bone removed until the dura was bared. There was no apparent pulsation, so with the aid of rongeur forceps the bone was cut away an inch to an inch and a quarter above the antrum. As the rongeur was being used in this region, a slight flow of pus appeared on the surface. As more bone was cut away, the flow of pus increased. Considerable amount of bone was now carefully removed, when it was found that we were directly over a large abscess cavity beginning a very short distance beneath the dura and extending towards the center of the brain and anteriorly. A crucial incision was made in the dura and the brain structures incised. The abscess was so near the surface that it was not necessary to make a very deep cut. From two to three ounces of pus were evacuated. Careful examination with the probe showed a cavity without any definite walls. The bulk of the pus being evacuated, rubber drainage tubes of the collapsible type, three in number, were pinned together and inserted about an inch to an inch and a half into the abscess cavity and anchored to the skin edge. The idea in using these tubes was that the drainage would occur in the spaces between them as well as through the tube, and that they would not block up, while if the cerebral pressure increased very much they would easily be forced out, nor would they traumatize in any way. It is well known that the problem of drainage in abscess cases is a difficult one, owing to the soft and easily collapsible walls of the abscess cavity. The wound was not sutured at any point. The operation lasted about an hour, and at nine o'clock in the evening he seemed decidedly better, was apparently conscious, the pulse had gone up to sixty-seven and his general condition seemed improved.

April 19th he had a restless night and complained greatly of pain the following morning, so the wound was dressed. The rubber tubes had been pushed out, and so were replaced by dry gauze wicks. A small amount of pus was steadily exuding. During the day the patient grew gradually worse, and by evening was almost entirely unconscious. The pulse had again gone down to forty-eight, the reflexes were quite abolished, and his only conscious remark was "Such a terrible headache." The interne reported that during the night there was a convulsion. At two o'clock the following morning, April 20th, he died.

Laboratory Findings.—He came to Fall River from Paterson, New Jersey, and gave a history of having had chills and vomiting spells. The chills he said he had had off and on for several years. Examination of the blood showed a white count of only 6,000; hemoglobin, 80 per cent; polynuclears, 63 per cent; large mononuclears, 18 per cent; small mononuclears, 16 per cent; eosinophiles, 2 per cent; mast cells, 1 per cent. With this unusual picture in a case apparently due to a mastoid or some abscess connected with the mastoid, a search was made for typhoid, tuberculosis and malarial organisms. Tuberculosis organisms were not found, the Widal reaction was negative, the malarial plasmodium were found on two examinations of the blood, and there was an enlarged spleen about two finger breadths below the ribs. In the first specimen of unstained blood these organisms were very motile, and seen very plainly. There was nothing definite or unusual discovered in the urine except almost a pure culture of colon bacilli. A spinal puncture was made just before the operation, the patient refusing this before, also refusing blood for a Wassermann. An examination of this spinal fluid showed three hundred and forty-three cells to the square millimeter, and a culture growth of staphylococcus, a negative Wassermann, Abderhalden was not done. Spinal fluid taken at the time of the autopsy, twelve hours after death, showed a strongly positive Wassermann and a culture growth of pneumococcus. The culture made from the pus from the abscess showed pneumococcus. Pneumococcus was also grown from the spinal fluid taken at the autopsy.

Partial autopsy made by Dr. D. J. Fennelly, hospital neurologist, twelve hours after death. Brain exposed by removing large area of bone, vessels of pia injected throughout, more marked in right hemisphere. Tried to remove brain en mass, but this was impossible on account of bogginess of substance. Removed part of cerebrum and part of cerebellum. Following incision of operation the abscess cavity was found directly beneath the opening that had been made at the operation for drainage. The cavity was found to be about two inches wide by one and one-half in depth. This had ruptured into the right ventricle, and the ventricle contained a semiliquid pus. The bones about the tip of the mastoid and the labyrinth macroscopically had an almost normal appearance. Microscopic examination was made of the brain tissue, sections being stained after the method of Nissl. Chromatolysis had taken place, the cell bodies being considerably swollen and the nucleus in many places peripherally located. Sections were also stained for intracellular fat, which was found to be present. Not much fat was found in the nerve fibers.

Some points of interest are: First, almost entire absence of tenderness over the mastoid at any time during his illness; second, extremely late abolishment of any of the reflexes in so extensive a process as the partial autopsy and operation proved; third, low leucocyte count; fourth, presence of malarial organisms; fifth, colon bacillus in the urine; sixth, pure culture of pneumococcus in the pus and the spinal fluid after death; seventh, negative Wassermann before death and a triple positive a few hours after death and absence of a cavity wall.

Did the malarial organism alone account for the leucopenia or difference in the Wassermann reactions? How account for negative Wassermann a few hours before death and a strongly positive a few hours after death? (This fluid was divided into several tubes, and all the tests were made at the same time with the same results, each test tube containing postmortem fluid was positive and each antemortem negative.) What had the colon bacillus to do with the case?

XXXVIII.

A CASE OF OTITIS MEDIA AND MASTOIDITIS FOLLOWED BY MENINGITIS — OPERATION — RECOVERY. AFTER EIGHT YEARS, DEVELOPMENT OF CEREBRAL ABSCESS—OPERATION—DEATH.*

By S. J. Kopetzky, M. D.,

New York City.

H. A., aged fifteen months, came under observation January 16, 1908, suffering with a very profound mastoid infection. Incision of the membrana tympani immediately undertaken, but because of no remission of symptoms and profound prostration, he was taken to the New York Red Cross Hospital and operated upon by me on January 18, 1908, two days after the advent of the disease. The disease was on the right side.

Nothing unusual was found at operation and the patient came out of anesthesia in good condition. During the 19th and the day of the 20th there gradually developed coma and the classical symptoms of meningitis. A consultation with Dr. L. K. Neff the evening of the 20th substantiated the diagnosis.

(The history chart of that time—1908—leaves much to be desired for a full and complete record of the case.)

Clinically, fever, failure to react to stimuli, opisthotonos and vomiting are recorded.

Believing we were dealing with a case of serous meningitis in which pressure symptoms predominated in the clinical picture, the patient was submitted on the evening of January 20th to a regional decompression operation as I was at that time performing it.

The operation consisted in exposing the squama of the temporal bone and opening to the dura through it, the bone not being removed as an osteoplastic flap, but eaten away with a rongeur until the requisite amount of dura exposure was obtained. The zygomatic root and its extension backwards was left as a ridge of bone to hold the brain and dura in place. The tegmen cellulæ was next removed, exposing the dura there. The dura was found tense and pulseless, and parallel incisions were made through it both in the region of the tegmen and in the region beneath the removed squamosa.

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*Read before the New York Academy of Medicine, Section on Otology, April 9, 1915.

A large amount of clear cerebrospinal fluid began to come from these openings, and the brain tissue bulged through the dural incisions. Drains of gauze were gently introduced and the skin edges approximated over the exposed area.

The next few days witnessed a marked improvement in the patient's condition. The most noteworthy was the complete relief of all symptoms and the excessive flow of cerebrospinal fluid. The dressings were saturated as well as the pillow upon which the patient lay. This continued for three days and finally ceased, and at subsequent dressings the drains were all withdrawn.

The patient eventually developed a hernia cerebri at the site of the open squamosa, the brain tissue, covered with granulations, protruding between the skin edges. By using graduated pressure applied by means of broad pads over the hernia the brain tissue was finally brought back into the skull cavity, but that portion of the hernia which protruded downward through the tegmental opening into the mastoid cavity was never replaced, because it was impossible to do so, and the granulation gradually grew in onto the rest of the mastoid cavity and merged with those from the brain substance and completely filled the cavity.

Finally, skin grew over all, and until this year the child presented no severe symptoms except such as I shall indicate.

The patient left the hospital on January 31, 1908, and the further history of the case was uneventful with these exceptions: When the child's position was shifted from the horizontal to the vertical, or was turned over rather suddenly while in arms, there seemed to be a period, at first of a minute or two and later of only a few seconds, when he would lose consciousness. If crying, he would become absolutely quiet, and then, the period having passed, he would resume where he had left off. If crowing with pleasure or otherwise exhibiting his consciousness of pleasurable sensation, the same thing would happen. I thought this had been due to the fact that the brain had become anchored by adhesions at the site of operation and hernia, and that the sudden shifting of the patient's position gave the brain a traumatic shock which produced the periods of suddenly arrested consciousness. Gradually his brain accommodated itself to the abnormality resulting from this lesion, and after six months such periods of loss of consciousness were no more to be noted.

The child presented a normal, somewhat large appearance for his age, but he did not attempt to walk until well past his second year, and his attempts at speech were equally slow. However, later, at the usual age, he attended school and kept well abreast of his class, although always a little slow in speech.

I saw the child again on February 8, 1915. He had an acute purulent rhinitis and complained of pain in the head, showing a temperature of 105° F.

The otoscopic examination was unsatisfactory, in view of an almost complete atresia of the canal walls.

Under general anesthetics the edematous tissue in the canal and the drum membrane were incised. The discharge gave the streptococcus pyogenous.

The patient's general condition remained good, mind clear, no absence of reflexes, no exaggeration of same, pulse rate between 110 and 130, respirations about 30.

For three days the condition continued, the temperature meanwhile ranging between 104° to 101°. The discharge from the canal was scanty and was deemed inadequate.

The patient was admitted to the Manhattan Eye, Ear and Throat Hospital on February 11, 1915, after a thorough physical examination had been proven negative.

Blood culture and spinal fluid examination were undertaken just before operation. The blood culture was negative. The spinal fluid was examined by Dr. Dwyer and gave the following:

Physical.—Large flocculi scattered throughout the specimen, otherwise clear.

Chemical.—Copper reduction present and marked. Lactic acid, small amount present.

Cytologic.—Considerable number of pus cells; predominating types are polynuclear neutrophiles, large and small lymphocytes. The cells do not show much evidence of degeneration.

Bacterial.—Negative from smear. Negative from culture (later report).

Operative Findings.—Upon incising the skin and carefully dissecting it off from the soft tissues beneath it, the old wound area of brain tissue covered by dura and connective tissues is uncovered. The bony postauricular wall is found partly eaten away, and what remains is soft, diseased and easily removed. The horizontal semicircular canal is in view. When a retractor is introduced to lift the protruding brain tissue which fills the old wound cavity, a thick creamy pus without odor escapes. This came mostly from the area just above the tympanic cavity.

The cultures from the pus give pure culture of the streptococcus mucosus capsulatus.

Drainage was established from the wound, but the brain was not punctured and the patient was returned to bed. The patient ran a temperature of about 101° to 102° with remissions to 99° almost daily.

The pulse never went below 108, the respirations stood between 26 and 28. The patient never lost consciousness and sat up at the end of a week to play and attend normally to all his functions. There was nothing to explain the temperature, all the reflexes were present, nor were there any focal signs. Three cultures were taken from the blood and all reported negative.

The second week started with a similar temperature curve, and it was presumed as this curve gradually neared the normal that the patient was making an uneventful recovery, and arrangements were made for his removal home.

On the 2nd of February, however, his pulse dropped from 66 to 56 to 54. There were no signs of meningitis. The knee jerk was missed from the opposite knee, and the cremasteric reflex on the opposite side was also missed. The patient (now nine years old) complained bitterly of intense headaches and could not sleep. He located the headache in the frontal region between the eyes. An examination of the nose and pharynx showed absence of pus in the frontal sinus region.

Believing that we were dealing with another abscess somewhere, on the 23rd of February the patient was submitted to an exploratory operation of the temporosphenoidal lobe.

Operative Findings.—When the wound was reopened the temporosphenoidal lobe was entered above the ridge which had been left at the original operation, and the searcher was introduced directly inward toward the tip of the petrosa, going inward about two inches, when pus was found. Enlarging the opening, between six and eight ounces of pus was recovered. After the cavity was emptied it failed to collapse and it was, therefore, presumed to be an old chronic abscess. The thickness of the pus also gave that impression. Double reflow drains were introduced, wound edges approximated and the patient put to bed.

The patient came out of the anesthesia in the possession of all his faculties, showed a good appetite, and again it was thought he would recover. At midnight the same night the temperature was 99.8°, at three o'clock it was 102° and at six o'clock it was 103.4°. He had a general convulsion at six o'clock and another at seven, and he died during the second convulsion.

No autopsy was permitted, but a search through the brain wound was allowed, and such search was made through the entire hemisphere of the brain, but no further abscess was located.

Comment.—It is presumed that the second infection occurred on February 6th, invading the middle ear, and there being no mastoid process to become infected, the brain tissue immediately became involved and an abscess formed or a reinfection of an old abscess took place. Because of the absence of cortex over this region there practically was present the same condition that one gets when a decompression operation is performed, and so the abscess could grow and produce no focal symptoms. The pus from the abscess gave streptococcus sapsulatus.

XXXIX.

SKIAGRAPHS OF THE MASTOID IN CERTAIN ATYPICAL CASES.*

By Harold Hays, M. D.,

New York.

The X-ray pictures that I am going to present are of four different cases of mastoiditis in which the X-ray proved of a great deal of value. In the majority of cases I do not believe that it is necessary to have an X-ray picture taken in order to make a diagnosis, but there are certain borderline cases where one is in doubt as to whether the mastoid is sufficiently involved to warrant operation. In the first three pictures I am presenting, the radiographic findings were such that, taken in connection with the clinical symptoms, a positive decision could be made as to immediate operation.

Case 1.—This patient, a male, fifty years of age, had had an acute otitis media with tenderness over the mastoid antrum for some days. The tenderness finally disappeared. There was no pain, no temperature, but a slight amount of parietal headache. At the end of seven weeks an X-ray picture was taken in order to corroborate the clinical findings of mastoiditis evidenced by profuse, prolonged discharge, with a sagging posterosuperior wall.

The X-ray pictures of the right and left mastoid are here presented. One can see very definitely the difference between the two sides. On the left side (normal) the mastoid cells show up clearly and distinctly, while on the right side the entire region is clouded and the interstices between the cells are poorly defined. This cloudiness extends well beyond the sinus, which can be readily seen as a line running downward and forward between the light and deep shadows.

Operation was performed the following day. A very large mastoid was found, which was entirely destroyed. In order to remove all the cells, a T-incision was necessary. A complete exenteration was done. The wound was closed down to the lower half inch, into which was inserted a narrow strip of iodoform gauze, placed well into the antrum. The patient left the hospital on the seventh day, and on the fourteenth day the wound was completely healed.

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*Read before the New York Academy of Medicine, Section on Otology, April 9, 1915.

Case 2.—Male, age twenty, developed an acute otitis media in the right ear, due to a pneumococcus. This subsided very nicely under local treatment after four days, but at the end of that time a reinfection took place, the responsible organism being the streptococcus mucosus. There was considerable pain radiating from the mastoid up over the parietal bone. There was a slight amount of discharge from the ear, with moderate sagging of the posterosuperior wall. Numerous incisions had been made with no definite effect. An X-ray picture was taken on the second day after this latter infection. This showed the mastoid to be distinctly cloudy on the right side. Two days later a mastoidectomy was done. It was necessary to operate for a sinus infection. The patient subsequently recovered.

The X-ray in this case showed very definitely that there was considerable involvement of the mastoid cells, although the interstices between the cells had not broken down. Comparison of the two photographs (Figure II) shows very distinctly that there is cloudiness on the right side. The outline of the sinus is very clear. The X-ray picture in this case not only definitely decided the diagnosis, but was of great help in showing the size of the mastoid and the location of the sinus.

Case 3.—A boy, age six years, developed an acute otitis media on both sides, due to a staphylococcus infection. Both ears discharged intermittently over a period of six weeks, during which time the child had no temperature, no pain, and no tenderness over the mastoids. The character of the discharge changed, the culture then showing an attenuated streptococcus. I advised having the child's tonsils and adenoids removed. At the time of this operation there was a slight sagging of the posterosuperior wall on the left side. After the removal of the tonsils and adenoids the temperature rose to 104°, but during the next four days gradually dropped to normal. However, the child seemed listless and would not eat. An X-ray picture was taken which showed a diffuse cloudiness over the mastoids, and after consultation with Dr. Whiting and Dr. Lewis it was decided that it would be better to open both mastoids if the child did not seem to improve within the following day or so.

Two days later a mastoidectomy was performed on the left side—the side where there had been some sagging of the drum. The X-ray of this side showed far more cloudiness than the other side. The cortex was very thick for a child of that age, and it was not until I reached the antral region that mucopus was found. This extended down towards the tip and over the sinus plate, reaching up into the superior petrosal recess. After cleaning out the cavity the wound was closed by primary suture.

As there was so much destruction on the left side, I decided it wise to open the right side, where I found a similar condition. The patient recovered within the course of the next two weeks.

In this instance we had a subacute mastoiditis in which there was no evidence of any mastoid involvement, such as pain, tenderness, or temperature, yet the X-ray showed definitely that both mastoids were diseased.

Case 4.—Male, age twenty years, developed an acute otitis media on the right side with high temperature, severe pain, and extreme tenderness. A paracentesis was performed on two occasions with very little subsidence of the symptoms. On the fourth day I determined that if the symptoms were no better within twenty-four hours it would be necessary to open the mastoid. An X-ray picture was taken, which showed a very slight cloudiness on this side in comparison with the other, but not sufficient to indicate operative interference. It was decided as a result of this to defer the operation, and on the following day the symptoms were less severe and the temperature lower. Within the following week all symptoms disappeared and the patient was discharged cured.

I feel very sure that in this last case if the X-ray had not shown so slight an involvement in comparison with the symptoms, that an operation would have been performed. In this instance the value of the X-ray examination can hardly be doubted.

In determining the value of X-ray pictures one must only consider them in conjunction with the clinical symptoms. Dr.

Dixon, who took these pictures for me, is an expert in this line, and his X-ray work of the mastoid cannot be commended too highly. Each one of the four cases illustrated, showing both mastoids, is an excellent example of what can be done in this line. His experience, extending over the past few years, leaves no doubt as to the great value of X-ray examination of the mastoid in those cases in which the clinical findings are obscure, or in those cases where one wishes to indorse his conviction that operative interference is necessary.

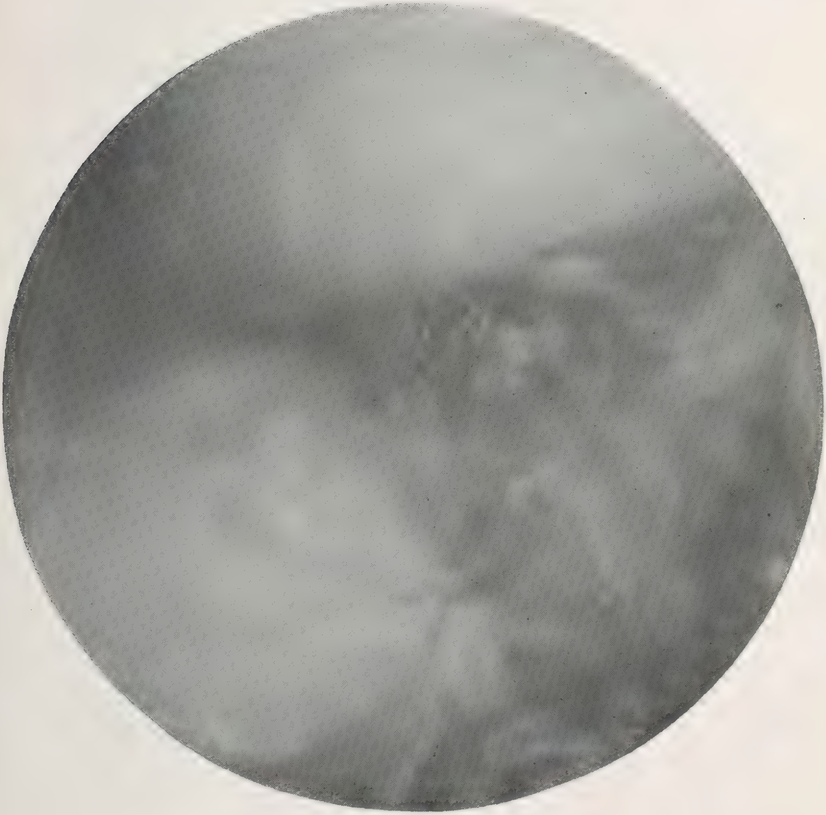

FIGURE 1.

Case 1.—Right mastoid.

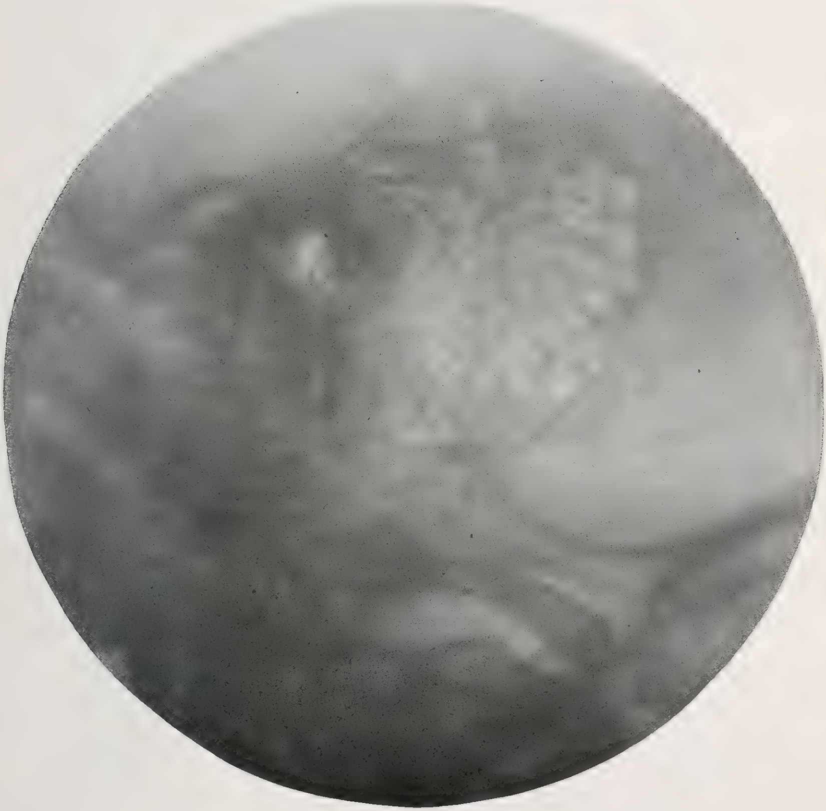

FIGURE 2.

Case 1.—Left mastoid.

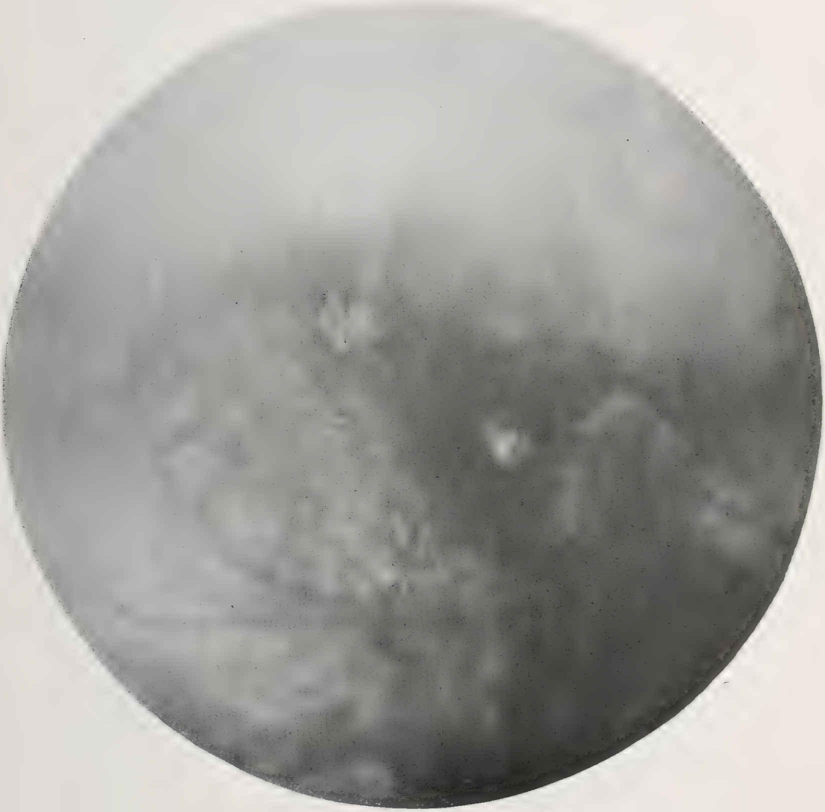

FIGURE 3.

Case 2.—Right mastoid.

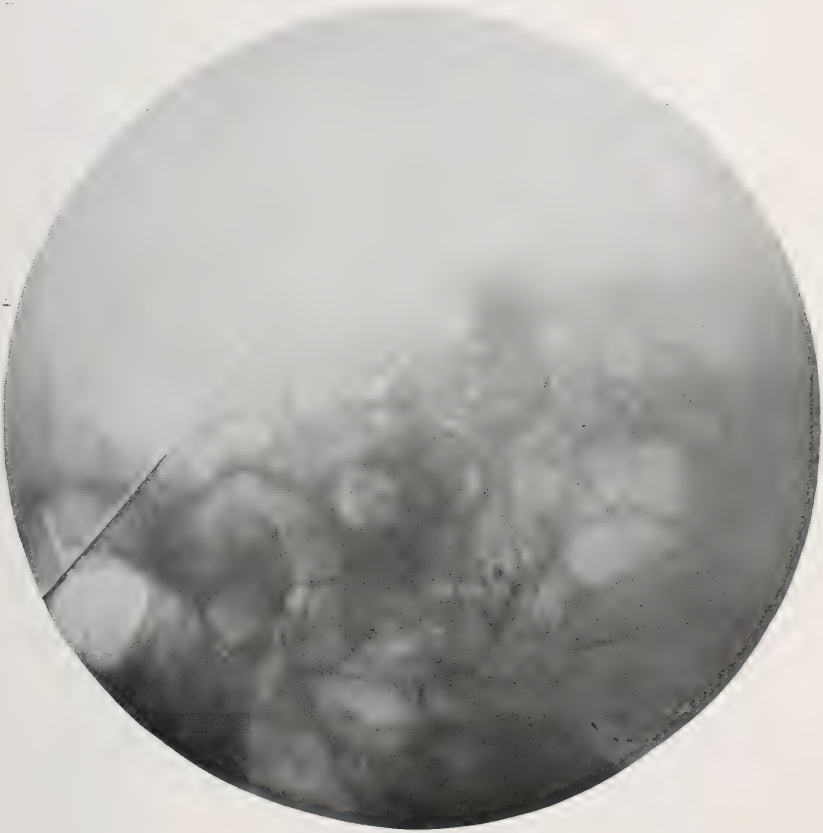

FIGURE 4.

Case 2.—Left mastoid.

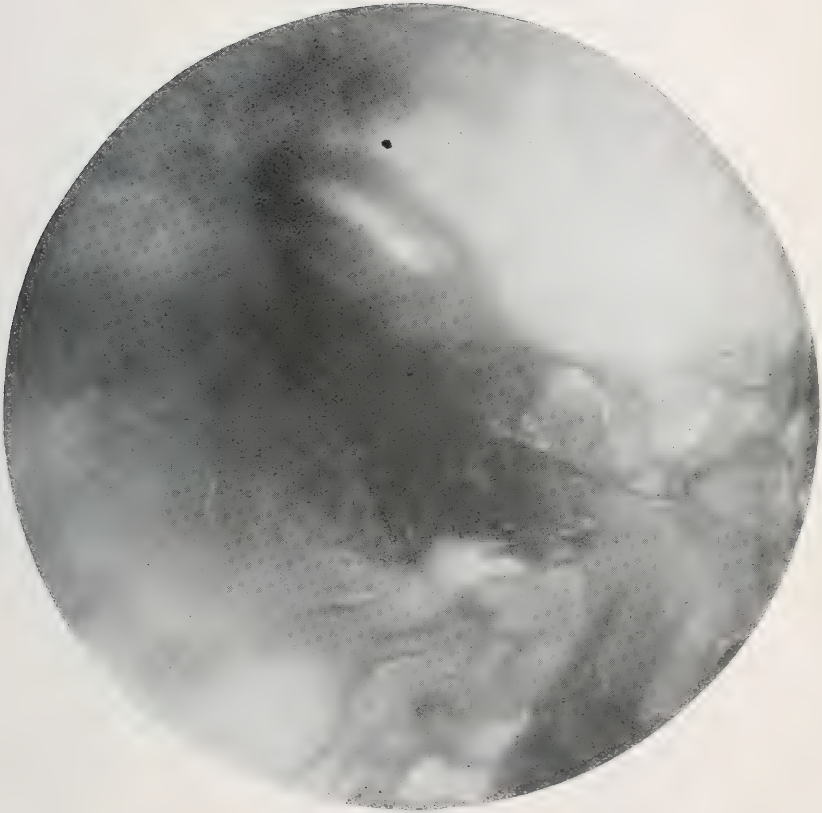

FIGURE 5.

Case 3—Right mastoid.

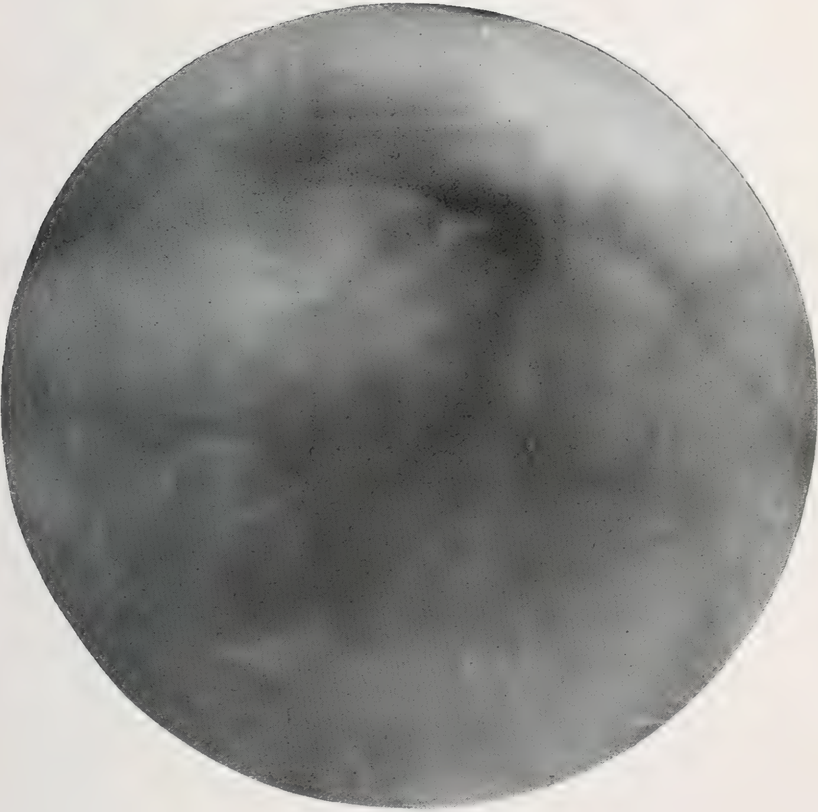

FIGURE 6.

Case 3.—Left mastoid.

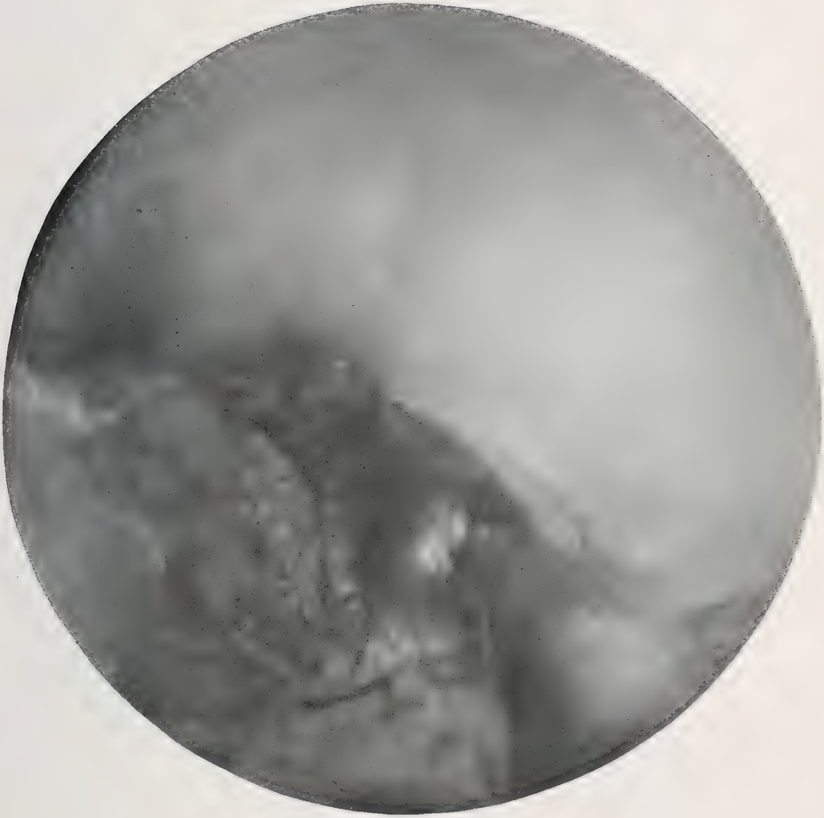

FIGURE 7.

Case 4.—Right mastoid.

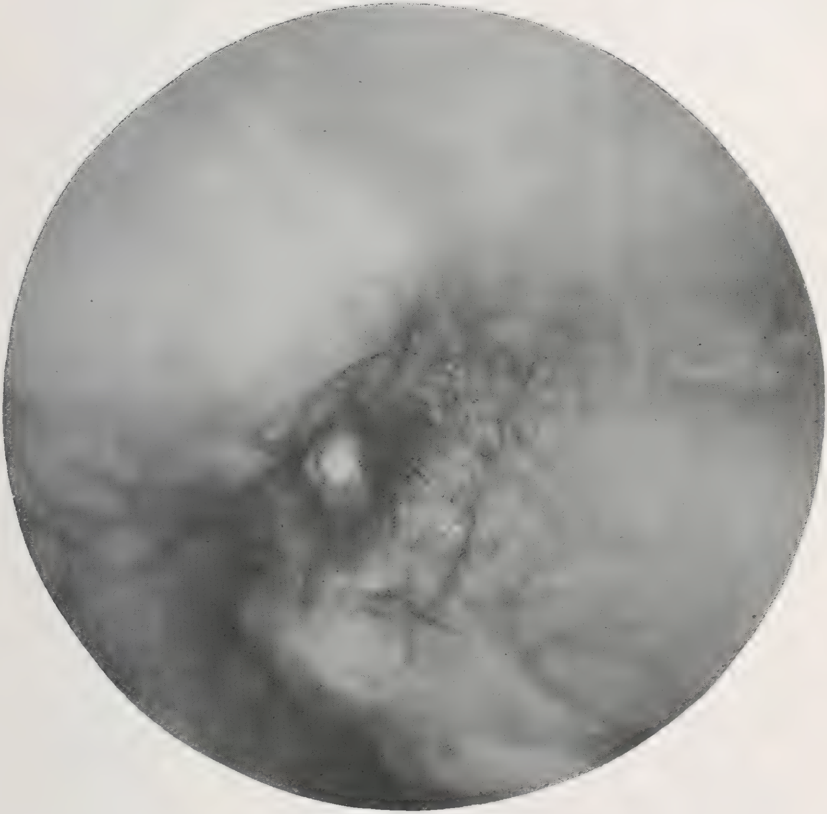

FIGURE 8.

Case 4.—Left mastoid.

XL.

THE STANDARD TONSILLECTOMY.*

By John Rice Fletcher, M. D.,

Chicago.

The history of operations upon the faucial tonsils is of doubtful credit to our specialty. Up to a few years ago tonsillotomy was universally practiced. Certainly up to as late as 1910 the best European authorities frowned upon tonsillectomy. Since then many have been converted to it. Tonsillotomy still prevails to no inconsiderable extent among us, partly because some operators will not change, but largely because many incompetents undertake this work upon the ground of its simplicity. As a matter of fact, an exquisite tonsillectomy is not beneath the dignity of the most highly gifted surgeon. On the contrary, those familiar with after-results will doubtless agree with me that the operation requires so much special training that even very able surgeons, as a rule, do not perform it acceptably. This is hardly to be wondered at since, although we have what may be properly called a standard operation, namely, instrumental dissection, we are by no means of one opinion how it should be done. In other words, the technic is not standardized. Until it has become so, my opening statement must remain true. Have we not a large number of advocates of the finger dissection? If crudeness, great trauma and the danger of infection are not enough to condemn it, certainly ten per cent of failures should. Up to a very recent date there were but two groups: the finger, and the instrumental dissectionists. This may be called the healthy hopeful period, because the instrumentalists were gaining fast. Their work was constantly improving. Not only did each try to excel the other, but also tried to excel his own work. In this frame of mind speed unfortunately stood high in favor, opening the door to the next step, the Sluder method. With the utmost deference and respect, not only to the author of this method, whom we all honor for many other reasons, but also to my Chicago colleagues, who are its ardent advocates, I must say that, to my mind, this is a great step backward. Speed is its greatest recommendation. If the speedy removal of the tonsil in its capsule constituted a tonsillectomy, nothing could equal it. A perfect dissection embraces so much more, that there can be nothing like uniformity in a single operator's work with this method. That it is a better operation than a good dissection few will claim; that on an average it fails in ten per cent of cases is admitted. Failure spells the reason for discarding it. One who acquires a good technic with forceps, knife, scissors, and snare does not fail. One case in ten is one case in ten too many. When this becomes the edict of the specialists, the casual operator in this field, be he general surgeon or not, must be bold indeed. Until we have fought our fight to a finish and speak with but one voice, authoritatively, any may infringe who will. For this reason a call to the colors of the two camps who alone are worthy of serious consideration now, the advocates of a perfect dissection and the Sluder method, seems to me timely. When we can agree upon a technic which completely removes the tonsil in its capsule, does not open the aponeurosis of the superior constrictor muscle, does not injure the palatoglossus or palatopharyngeus muscles, which conserves every bit of the membrane reflected over the tonsil, which prevents fusion of the three muscles named and leaves a linear scar in a rudimentary fossa, which does not injure the voice and which lessens greatly the frequency of secondary hemorrhage, we will have achieved the ideal, in the light of our present knowledge. This is not a dream, but is being done uniformly by many who do the instrumental dissection—and I believe uniformly by them alone. I do not wish to be understood as saying that each case by any operator is as good as another by the same operator, but I do mean to say that all cases can be so well done that none of them can be called anything but good. Even those engaged in the correction of speech defects can have no objection.

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*Read before the Chicago Laryngological and Otological Society, March 16, 1915.

I will give you in detail the technic of an instrumental dissection which seems to me to fully accomplish the desirable features enumerated above, without the least insistence upon its being absolutely followed. When the last word has been said, each operator will put individuality in his work. This is the art of surgery. Just so long as it is not mechanical, one will excel another. This art can, however, be reduced so nearly to science that, upon the whole, little will be left to be desired, from the present point of view.

In the first place, it is desirable that the operation shall be as bloodless and painless as possible. The first in order that the operator may see every detail. The second needs no comment. For the accomplishment of these purposes the following formula will be found good: Cocain hydrochlorat, one grain; adrenalin solution, twenty minims; normal salt solution, eighty minims. Of this not to exceed ten minims to a tonsil may be safely used, as follows: With a hypodermic syringe, the needle of which is bent at an angle of about sixty-five degrees, make blisters under the membrane just as they are made under the conjunctiva in eye operations—first, over the insertion of the anterior pillar; second, at its center; third, just above the mouth of the superior crypt; fourth, at the upper half of the posterior pillar. I use this injection in all cases, both local and general. Its use in hundreds of cases in small children under general anesthesia has not shown bad effect in a single instance.

In local anesthesia a much larger quantity of half of one per cent novocain solution with five drops of adrenalin to the hundred may be thought better. The blisters are made as before, but larger.

Lately, at the suggestion of Dr. Shambaugh, I have used twenty to thirty minims injected behind the tonsil in addition to the blisters. This seems to give more complete anesthesia. The first formula is more useful for blood checking under general anesthesia.

The tonsil is taken hold of only in that part containing the crypt mouths. For this purpose the smallest pattern Tidings forceps have no equal. Their grasp is small, suggesting slight traction. Just enough pull should be made to unfold the membrane, which, you will remember, passes over the face and posterior border of the anterior pillar, then over the face of the tonsil, making a distinct tuck or fold which extends upward and backward, following the arc of the palatoglossus muscle. There is a distinct demarcation between this membrane and the tissue through which the crypts open. This line is very closely followed in dissecting the membrane from the tonsil.

Under general anesthesia let your patient lie flat upon an ordinary operating table, mouth well opened and held so with a mouth gag on the patient's right; head turned slightly to the left. Reflect a good light into the throat, inject first one and then the other tonsil, as above described, using the index finger of the left hand as a tongue depressor. Grasp the tonsil and lightly draw it out as above mentioned. Begin the incision at the lowest part of the plica tonsillaris, carry it upward just over the mouth of the superior crypt. Here is a danger point. If the incision is carried too far medialward the outline of the posterior pillar will be changed from an arch to an angle. In other words, it will have been cut, perhaps completely through. If, however, the tonsil is moved in the direction which brings into view the whole of the membrane of the posterior pillar, the incision may be safely carried around this point and downward to the lowest part of the tonsil. Beginning now at the starting point, carry the incision down to meet the other end. This completes the cut. Now free the membrane from the capsule. I usually do this with the back of my knife, which is, as you see, slightly, very slightly, hooked. Enter the fossa by pushing the membrane over the upper pole of the tonsil with the flat or back of the knife blade until the bluish aponeurosis of the superior constrictor is seen. Here begins the blunt dissection. Slightly curved round pointed scissors are used for this purpose—Simms' uterine scissors, in fact. With a slight downward and backward push the upper part of the tonsil is freed, in the meantime pulling this part of the tonsil down so that the point of the scissors never goes beyond the sight. The whole anterior portion of the tonsil is now liberated by making a rotary motion with the scissors forward and toward the tongue base, provided it can be done with but little force. If not, the case is not suitable for blunt dissection and must be done with scissors, cutting or rather nipping the adhesions close to the capsule. Two-thirds of the tonsil are now free, making it more movable.

The most painstaking part of the operation remains to be done, namely, the separation of the fibers of the palatopharyngeus muscle from the capsule, into the posterior third of which they are directly inserted. This is usually best done by sharp dissection with the scissors, following the capsule very loosely, or even nipping slightly into it rather than in the other direction, as none of the muscle fiber can be spared and they are prone to contract. After this is finished any remaining adhesions at the lowest portion of the tonsil are severed. The dissection is complete when the tonsil droops over the pyriform fossa. The snare here shown is now used. Pass the forceps through the loop, taking hold of the upper part of the tonsil, pass the loop over the tonsil, but do not close it while the canula is horizontal. This will certainly take a part of the posterior pillar which you have so carefully saved, and not infrequently take the uvula also. If, however, the handle of the snare is lifted upward and the loop is so placed that it cuts from below upward, these faults cannot occur. A loop much larger than the circumference of the thumb joint is dangerous. Any tonsil will go through this size, and the pedicle which it has to cut is about the size of the little finger. When during the dissection a vessel is cut and there is considerable bleeding, tie it with a catgut at once, then proceed. If you wait until the tonsil is out, you may have no little difficulty in finding the bleeding point. The ligature is easily tied when one learns the trick. I would like to call your attention to this snare, the separable ends of which increase its usefulness. The authorized manufacturers are F. A. Hardy and Company and V. Mueller and Company.

If I have been overbold in presenting the technic of my operation, I will confess that the ultimate result and praise from others have led me to believe that it has merit. A real desire to add something to the sum total of achievement in our specialty has urged me on. I would not have you think that I regard it as better than all others, but hope it is worthy of your consideration.

In conclusion, allow me to place emphasis on the following points:

First, save all the membrane possible.

Second, make your incision entirely around the tonsil.

Third, employ sharp dissection rather than force, because the weakest tissue will yield to the latter, whether it is muscle or connective tissue. In case of dense adhesions, neither blunt dissection, the Sluder instrument nor any modification of it will pass through this tissue by choice. Just in these cases the greatest skill is necessary, and I would remind you that this is acquired by close attention to every case.

Fourth, beware of the posterior pillar. It is here that damage is most frequently done.

Fifth, remember that the snare is not an innocent instrument which cuts always where it should. On the contrary, it will cut just where you place it and will take into its fold all that comes in its way.

Sixth, last and most important, see all that you do. If only a few drops of blood are in the way, have them sponged out. No suction apparatus is necessary. It will be observed that I use no tongue depressor.

Under local anesthesia there is no difference except that the patient sits before you and no mouth gag is used.

XLI.

LOCAL VERSUS GENERAL ANESTHESIA IN NOSE AND THROAT OPERATIONS.*

By Joseph C. Beck, M. D.,

Chicago.

In presenting this subject for your consideration the writer wishes to make it clear at the outset that it represents a statement of facts on the practical application of the various methods of anesthesia, based upon personal experiences and observations, in the past fifteen years, and not a scientific treatise on anesthetics and anesthesia.

Many details, although important, must be omitted, owing to the time limit; consequently, I shall confine myself to the most essential matters in the criticisms of the various substances and methods used in anesthesia in nose and throat operations.

Local Anesthesia.—To Kohler and cocain belong the great credit for local anesthesia, and its discovery and application in nose and throat work have brought about a great progress in this field of surgery. By its means it is possible for most nasal and throat operations to be performed in the offices, a factor which still encourages many operators to perform their operations under local anesthesia.

On account of the possibilities of cocain poisoning, there has been and is a demand for substitutes, of which tropococain, alypin, eucain, beta eucain, novocain, stovain, quinin and urea hydrochlorid are some of the most important that have been recommended. In addition, it was found that the local applications of solutions of adrenal gland extracts aided the anesthetic effect as well as prevented the rapid absorption of the poison. Up to the time that novocain was brought forward as a local anesthetic it had been our experience that none of the above mentioned substitutes did the work as well as cocain, and even now we find that in some cases we must resort to the latter to get anesthetic effects. In all our experience I remember but one distinct case of cocain poisoning from application of a five per cent solution in a throat operation, this occurring in a boy nine years old, with perfect recovery. Besides this case we had a few cases of overstimulation. It is our custom to employ a twenty per cent solution, swabbed carefully over the mucous membrane, and subsequently to fill the nasal cavity completely by means of the kite-tail shaped tampons (Fig. 1) saturated with a five per cent cocain solution to which are added a few drops of adrenalin solution, 1/1000. In septum and throat operations we employ the injection of novocain, one or two per cent solution, and never make use of the pure cocain. In external operations, as sinus operations, nasal plastics, resections of a protruding cartilage of the septum, or operations on the larynx and pharynx, the nerve blocking method of anesthesia, associated with the Schleich method of infiltration, has given us excellent results.

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*Read before the Chicago Laryngological and Otological Society, February 16, 1915.

Spinal Anesthesia.—Several years ago, when Jonnesco visited this country and demonstrated spinal anesthesia by means of stovain solution, I operated upon three head and neck cases by this means, but found the anesthesia not at all satisfactory.

The opening of an abscess or resection of some small growth can very often be performed by the application of a spray of ethyl chlorid without any sensation to the patient; besides, it can be reapplied as often as necessary without much harm to the tissues. Particularly valuable is this method for opening furuncles about the nasal vestibule and external ear.

General Anesthesia.—Under this head we consider:

1. Ether.
2. Chloroform.
3. Nitrous oxid.
4. Alcohol, chloroform and ether, or ACE mixture.
5. Bromid of ethyl.
6. Chlorid of ethyl.
7. Somnoform.
8. Morphin.
9. Scopolamin.
10. Hyoscin.

From 1895 to 1901 it was our custom to employ chloroform as the general anesthetic in preference to ether, and I can unhesitatingly state that the results were much more satisfactory from the anesthetic and after-effect point of view. We never had a death from its use, but we did have one from ether. Nevertheless, following the general cry against chloroform, we gave up its use, and now employ it only in rare instances. We use it almost exclusively in infants, especially in cleft palate operations. The anesthetic that we employ is ether, and without going over the past history of its application, I will describe the method that we now use as a routine in nasal, mouth and throat operations.

Nasal Operations.—The patient is anesthetized primarily by either the drop method or by placing two or three ounces of ether into the rubber bag and holding the rubber mask firmly over the nose and mouth (the rebreathing method, as recommended by Rovsing). The patient is encouraged to breathe deeply and regularly. In children crying causes vaporization of the ether by rhythmic distention and collapse of the bag. As soon as the patient is well under the primary anesthesia and the pupils are contracted, we sometimes insert a tracheal catheter through the larynx, by the method suggested by Jackson (the head turned back sharply and introduction aided by means of Jackson's or any other laryngeal spatula). The vaporized ether, which has been properly warmed and filtered, is allowed to enter the tracheal catheter by attaching it to the rubber tube coming from the ether apparatus. This apparatus, which was perfected by Mr. Walreich of V. Mueller & Company, according to my ideas, is the outcome of much labor and expense on their part, and I desire to express my appreciation to them at this time. We have tried out almost every apparatus on the market and three of our own devices and found them all defective in one way or another. It is essential to have a suction apparatus in connection with the pumps, and these should work independently as to the degree of power, for that has been the most difficult matter to perfect in the apparatus. The objections to the intratracheal method are the management of the laryngeal speculum and the possibility of irritating the larynx and trachea by the catheter. Again, the passage of the catheter consumes additional time. The other method is to allow the ether to pass directly into the mouth or pharynx and to be inhaled by the patient. The latter is the method most frequently employed by us.

We employ suction in order to keep the nasal cavity free from blood, as well as to prevent it from flowing into the pharynx. To do this effectively we have a rubber tubing that has at one extremity a trumpet-shaped piece (Fig. 2) which is intended to fit snugly into the posterior choanæ, and the other free end is attached to the rubber tubing going to the suction bottle. The introduction of this trumpet-shaped rubber tube is made as follows: Pass a rubber catheter or the writer's soft palate retractor through the side of the nose to be operated upon and withdraw through the mouth. Tie the thread which holds the bulbous end of the suction tube to the rubber tubing and withdraw it through the nose, as one would introduce a postnasal tampon. By drawing fairly firmly on this thread one will cause the bulbous end of the suction tube to fit into the choanæ. In order to facilitate the suction of the blood the anterior nares need only be closed for an instant, when the entire nasal cavity will become clear. It stands to reason that adrenalin has been freely used before operating. Two of these bulbous rubber tubes may be inserted at once; but as usually but one side of the nose is operated upon at a time, one can repeat the procedure of placing the bulbous rubber tube into the other side and temporarily tampon the operated side to prevent oozing.

Mouth and Throat Operations.—After the primary anesthesia has been effected as described in the nasal operations and the mouth gag applied, the patient is made to breathe through a curved metal tube which is attached to the rubber tubing leading from the ether bottle. Suction is accomplished by means of rubber tubing whose end is cut slightly oblique to prevent it from attaching itself too firmly to the tissues. The regulation of the amount of ether or suction required is accomplished by two independent cut-offs to the pumps. It is estimated that about twenty per cent of ether is required to keep a patient anesthetized, and this measurement is made approximately by the size and number of the air bubbles that are seen within the ether bottle. As to the warming of ether, it is essential that it shall be surrounded by a water jacket which is kept at a constant temperature of 120° F. This insures a proper rarefaction of the ether. After the ether leaves the bottle it is passed through a chamber which has a temperature of 160° F., which further reduces the irritability. It is then allowed to pass through a gauze filter before it reaches the patient by means of rubber tubing. This rubber tubing should be as short as possible to prevent the cooling and condensing of the ether vapor.

Another method of ether anesthesia which we have employed recently in only a few cases, is by way of the rectum, according to Gwathney. The bowels are previously thoroughly cleansed by two high enemata; then six ounces of ether and two ounces of olive oil mixture are injected, permitting it to flow in slowly. In children one-half to two-thirds of the quantity of ether and oil are employed. It requires from one-half to one hour before the patient is thoroughly anesthetized, and it requires sometimes eight to ten hours for the anesthesia to disappear. It is essential if the patient appears to be too deeply anesthetized to remove the remaining solution at once and to wash out the bowels by means of very cold water. Washing the bowels with very cold water is absolutely necessary at the completion of the operation. The long sleep after operation has been our greatest objection. We have never had any trouble during or after the operation from its use, and the patient is certainly relaxed. In cases of mouth and larynx operations it has worked most admirably in our experience.

Nitrous Oxid.—About eight years ago I made a number of observations of operating, particularly in tonsils and adenoids, by employing an expert anesthetist to give the continuous gas anesthesia. I found that in a number of the children there resulted an inflation of the middle ear and stomach, and in one case—a child of a dentist who insisted upon gas—there resulted a stomach distention that caused nausea and vomiting for more than a week whenever the boy drank or ate.

The A. C. E. mixture we formerly employed with very good results, but since it cannot be vaporized and warmed we have abandoned its use.

The bromid and chlorid of ethyl and the somnoform are anesthetics that are of short duration, and consequently not suitable to present day methods of operating in the nose and throat. Besides, they have been found dangerous.

Morphin as a preliminary to ether anesthesia is well recognized. We employ it in combination with atropin only in very nervous individuals. Formerly it was given as a regular routine in each case, but we have noted since employing the open method of etherization certain symptoms of slow breathing and protracted sleep after the anesthetic that we do not find when we do not use it. The same is true in the employment of hyoscin.

Scopolamin and morphin we have used as anesthetics a number of times with excellent results, especially in cases where a general anesthetic could not be given. The foul breath so frequently observed, as well as the slow pulse, are among the objections we have found. Besides, it becomes necessary at times to employ some local and some general (gas or ether) anesthetic to keep the patient quiet enough to operate upon him.

After this statement of facts from our experience with these various methods of local and general anesthetics, I wish to call attention to one of the most important questions—as to the choice of a local or general anesthetic. I refer to the work of Crile on the effect of mental shock or fear on the repair of the tissues after operating and on the deleterious effect of this mental shock and fear on the nervous system. I am sure that most every operator has observed what we term postoperative neurosis, which is analogous to the posttraumatic or postpartum neurosis. I have made a close study of this condition and have found certain symptoms, behavior or statements made by patients during and immediately after an operation under a local anesthetic, which enabled me to say that in some particular cases there would be manifested more of this postoperative neurosis than in others. I refer particularly to the bravado actions when the operator declares that he has finished an operation. The patient becomes very much excited and talkative. Usually such a patient has within a week an attack of mental depression with insomnia, headache and all sorts of symptoms. I do not wish to say that one never sees the postoperative neurosis in general anesthesia, but certainly not nearly so frequently. I further believe, based upon personal experience, that if one would follow the teaching of Crile in applying the method of anoci association, by blocking off locally the nerves by injecting novocain solution, one would see less of these neuroses following general anesthesia.

The next important point in the choice of a local and general anesthetic is the question of pain that is experienced even in a thorough local anesthetic. Pain is a relative phenomenon, and different individuals are more or less susceptible to it. Who does not recognize the hysteric individual whose sensitive mucous membranes can be manipulated with practically no response? Again, there are patients who during and immediately after operation under local anesthesia declare there was no pain; but to their immediate friends and relatives they make a different statement. A more important factor is the ability to do thorough removal of the pathologic processes and the proper stopping of the bleeding and dressing, which often is not possible in a very nervous patient. A fourth reason, and one that I have learned to appreciate very much, is that in addition to the strain put on the operator when working under a local anesthetic, he must at the same time act as his own general anesthetist by the suggestive method—a sort of hypnotism. The one great advantage in the local anesthetic is the saving of time for the operator as well as the patient; but I doubt very much whether this factor can be taken into consideration after having stated the advantages of the general anesthetics. I believe that as soon as the technic of general anesthesia is made more simple and can be considered as safe as it is now, more nose and throat operations will be performed under general anesthesia.

I have said nothing as to the importance of a general examination, physical and laboratory, as well as thorough preparation for the operation, believing this not to be within the province of this paper. I would, however, like to close by thanking Dr. Lynch of New Orleans for calling my attention to the routine employment of bicarbonate of soda, from thirty to sixty grains, in six ounces of water, by rectum, one-half hour before operation. The purpose of this is to prevent the possibility of an acetonemia from the ether absorption. This acetonemia is not serious unless the patient be a diabetic, as in that condition its use will often cause nausea and vomiting after the operation.

Since this paper was read in February, 1915, we have employed ether vapor anesthesia by the pharyngeal route in several hundred nose and throat operations without a single mishap. We wish to report some further studies on general anesthetics, with the presentation of an improved apparatus which is based upon our observations. We found that it required altogether too long a period for the patient to become anesthetized, and they did not recover consciousness soon enough after operation; however, no longer than from other means of administration of ether. We believed that it would be ideal if we could put our patient asleep by nitrous oxid and oxygen, gradually adding the ether until complete anesthetization took place, and when the operation was considered practically completed to discontinue the ether and finish with nitrous oxid and oxygen. In order to study this, with my associate, Dr. W. P. Haney, I went to Cleveland and Toledo, Ohio, where we had ample opportunity to work out the problem. The result of these studies was the construction of a new apparatus (Fig. 3), which is a combination of the former ether vapor and suction apparatus with the nitrous oxid and oxygen tanks added.

Instead of sending the vapor into the mouth and pharynx by means of the hook-shaped tube over the corner of the mouth, we pass the ether into the epilaryngeal space by means of a tongue depressor, carrying on it the supply tube for the gas and ether. This prevents the marked dispersion of the gases.

DESCRIPTION OF THE APPARATUS.

The stand, which is built very substantially and contains all the necessary parts, is easy to transport. The motor has a pump for air pressure and one for suction, each acting independently. This independent action is one of the most important factors for success. Flexible metal tubings covered with rubber lead from the pumps to two bottles which may be hermetically closed. One bottle is for the ether and contains a metal tube which terminates in a conical hollow button with about thirty small perforations. This tube can be pulled up or pushed down, depending on the concentration of ether desired. The bottle rests in a metal container (water bath) for the purpose of keeping the ether from freezing. It is provided with a slit one-half inch wide, and is closed by a strip of mica, in order to show the quantity of water in this metal container as well as of the ether in the bottle. There should never be more than one inch of water in this container. This container with the ether bottle stands on an iron plate which contains a heating unit deriving its heat by electricity, in order to keep the one inch of water at a definite temperature. Another flexible metal tubing covered by one of rubber passes from the ether bottle to the mixing valve to join the supply of nitrous oxid and oxygen. The other bottle is utilized for suction of blood and secretion. The table also contains the two tanks, one for nitrous oxid and the other for oxygen. From these the supply pipes pass to the two rubber bags with pressure valves. From these bags the tubes pass to the before-mentioned mixing valve. This mixing valve indicates the percentage of either of the gases alone or in combination, according to the position of the arrow point. With this mixing valve is connected the short tubing which goes to another heating unit (electric wire) covered by a metal chamber, and immediately attached to this is a glass chamber filled with loosely fluffed gauze to assure the purity of the gases. The supply tube to the patient passes from this glass chamber. The end of this tube has a slip joint which is easy to change from a mask to a mouth hook or tongue depressor. In order to make the motor as noiseless as possible, it and the two pumps are enclosed within the stand. The switch and air controls for both bottles are outside.

While we still adhere to the statement made in the paper in regard to the preference of a general anesthetic to a local, we desire to state that unless there is some distinct reason why a local anesthetic should not be used, we are never unwilling to employ it when the patient prefers it to the general. We recognize some of its advantages. Up to the publication of this paper the writer never employed pure cocain in nasal operations, with the exception of one case, and that was at the time when it was first recommended. It appeared to have a very bad effect on that patient. We noted, especially in the past two years, fibrinous exudate following a large number of nasal operations in which we employed local application of cocain in five per cent solution by means of tampons. We were not able to explain it. We finally employed the cocain flakes rubbed on the mucous membrane, and since that time with the rarest of exceptions do we have any exudates forming. Hence, we employ that method of local anesthesia in all intranasal operations.

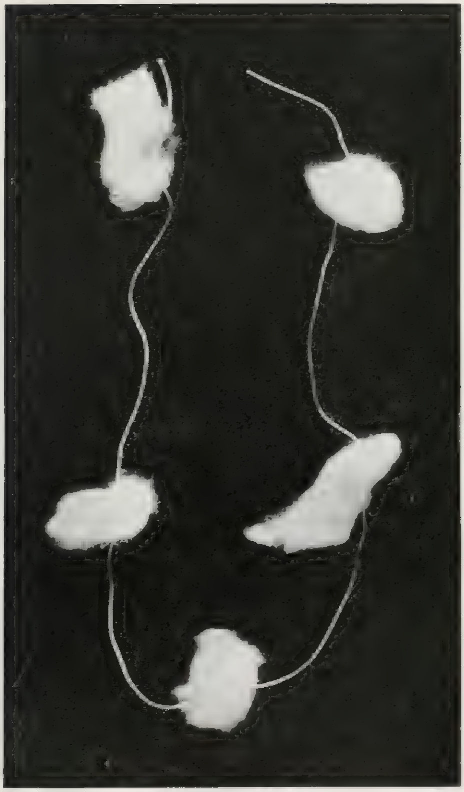

FIGURE 1.

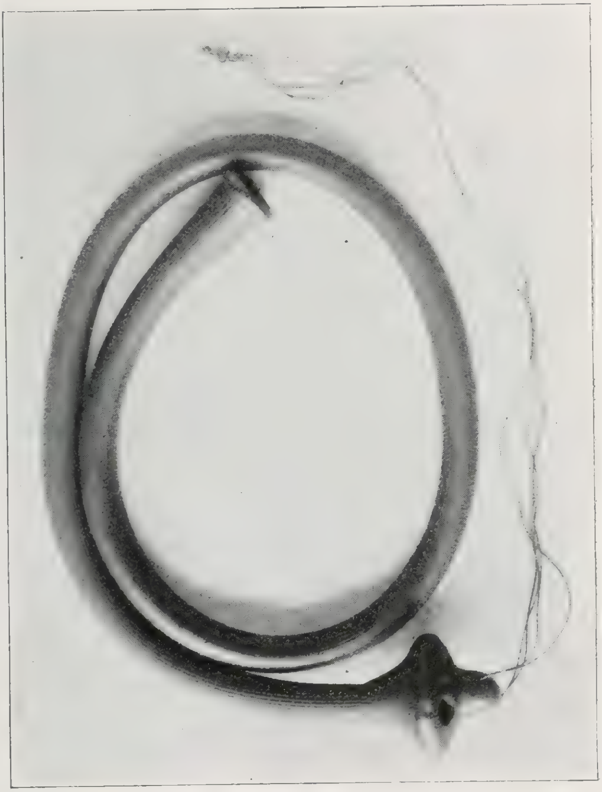

FIGURE 2.

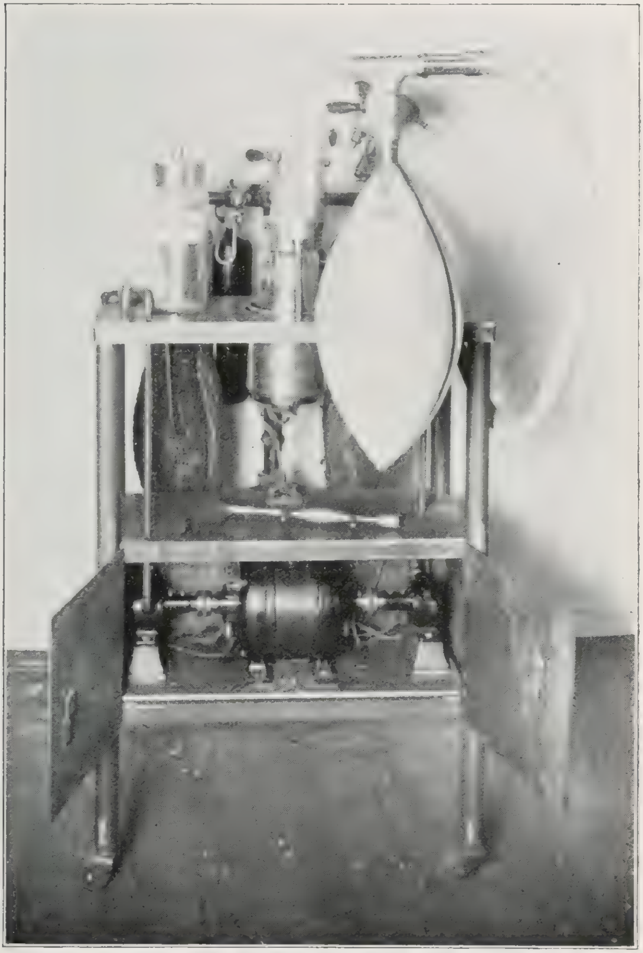

FIGURE 3.

XLII.

DECOMPRESSION FOR THE RELIEF OF CHOKED DISC FOLLOWING THROMBOSIS OF THE LATERAL SINUS.*

BY

HARRY FRIEDENWALD, M. D., AND J. W. DOWNEY, JR., M. D.,

BALTIMORE.

Choked disc is not an unusual occurrence in thrombosis of the lateral sinus, and is mentioned in all works upon the subject. Kipp[1] observed it in eight per cent of his cases, and Jansen[2] in fifty per cent; numerous writers have reported cases in which edema of the optic nerve was observed during the course of a lateral sinus thrombosis or following the ligation of the internal jugular vein for the cure of that condition. Until recently, a satisfactory explanation has not been given for this otitic complication; nor have we had any guide for the relief of the choked disc and the prevention of the optic atrophy and the resulting loss of vision which is certain to follow.

A case occurring in the practice of one of the writers, and reported some time since[3], is illustrative of the ordinary course and termination of these cases. A brief history of this patient is as follows:

The patient, a colored woman, aged thirty-two years, was first seen on February 20, 1906, for acute suppurative otitis media and mastoiditis on the left side. The patient did not consent to an operation until March 3d. There was pus under some pressure in the mastoid cells, and the bone was soft. The lateral sinus was exposed for about one-half an inch; part of it was found covered by granulation tissue. The tip of the mastoid was one large cell filled with pus and granulation tissue, on the posterior part of which the sinus was likewise exposed. After packing the latter cavity and withdrawing the packing there was a profuse hemorrhage from the lateral sinus, though no violence had been used. It was controlled by packing with iodoform gauze. Her temperature before the time of the operation was about 99°, pulse, eighty to ninety-eight. On the following day the temperature was irregular, reaching 103.6° on the fourth day after the operation, while at the same time her pulse dropped on the second day after the operation to sixty-four, and remained below seventy for several days, except when the temperature was very high and the pulse rose to one hundred.

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*Read before the American Otological Society at its Forty-eighth Annual Meeting, at Niagara Falls, June 4, 1915.

On the fifth day (temperature between 98.8° and 100.5°) abducens paralysis set in and mild optic neuritis was seen. From this period on the temperature remained normal, though the pulse continued slow during the entire first week, but the neuritis increased and rapidly became a typical choked disc with hemorrhages in both eyes, more marked in the left.

Seven months after the operation there was very little swelling of the discs, the veins slightly tortuous, but not very full, the arteries somewhat narrow, the color of the discs pink, and margins obscured; the condition of the left eye being more marked than that of the right eye. Vision right eye, 16/30; left eye, 10/100.

In this case, which was attributed to serous meningitis, we interpret the choked disc as resulting from the thrombosis of the lateral sinus following injury of its ulcerated wall and the firm packing required to control the hemorrhage.

In view of the serious damage to vision in these cases we determined to avert it, if possible, in the following case which, in the symptoms and early course, greatly resembles the first. When choked disc became definitely established, subtemporal decompression was performed. The history of this case and the result of the operation are as follows:

Eliza C., colored, twenty-five years old, was admitted to the Baltimore Eye, Ear and Throat Hospital, February 13, 1914, having been ill for ten days with discharge from and severe pain in and around the right ear. Her temperature was 103° on admission. She was extremely tender over the mastoid antrum and tip, and there was a profuse seropurulent discharge from the right ear. The patient was operated on immediately for acute mastoiditis, and the operation disclosed nothing out of the ordinary. The mastoid was of the large cellular type and was filled with pus and granulations. The dura was not exposed at any point. The patient was returned to bed in good condition and her temperature on the following morning was 99°. She was not entirely comfortable, however, and by three o'clock in the afternoon of February 14th her temperature had again risen to 104°. The wound was reopened and irrigated and the temperature came down to 100°; but by the following afternoon there was another sharp rise to 104°. There were chilly sensations and the patient was undoubtedly septic. The temperature and the symptoms became more and more clearly those of lateral sinus thrombosis. On February 20th (six days after the mastoid operation) the internal jugular vein of the right side was ligated and the lateral sinus exposed and opened. This operation, likewise, presented no unusual features. The internal jugular was smaller than usual and the glands along its course were enlarged. The sinus, when exposed, was slightly flattened but not collapsed, and bled freely when opened. The condition was that of beginning thrombosis, or rather of phlebitis of the lateral sinus.

The patient made an uneventful recovery, the temperature returning to normal by the third day, following which there was never a rise of temperature above 100°. This almost normal course of the temperature is of extreme interest, in view of the later complications in the case. Cultures made at the time of the mastoid operation were negative. Later cultures from the mastoid wound gave a faint growth of the streptococcus mucosus.

Although the patient seemed to be progressing well, she was never quite comfortable, and complained a great deal of sore throat and headache.

Four days after the operation she had severe headache in both the frontal and occipital regions. Six days following the operation she complained of poor vision. An ophthalmoscopic examination made at this time disclosed blurring of the edges of the optic nerves, and fullness of the veins of the fundus oculi. The condition was more marked in the right eye than in the left. For two days, slight edema had been observed in the neck and the right side of the face, most marked around the eye. This was transient and had disappeared on the sixth day after the operation. The swelling of the optic nerve increased rapidly, the papillæ becoming markedly elevated, the retina edematous around the nerve entrances and the veins enormously dilated and tortuous. On March 4th small hemorrhages were noted in the right retina. The choked disc was at all times more marked in the right eye than in the left. Vision tested at this time showed: right eye, 16/40; left eye, 16/60, and it was found the same at all examinations made before the decompression operation. The visual fields for white, blue and red were concentrically contracted about ten degrees in each eye. From March 7th on to the time of the decompression there were no changes noted in the condition of the eye grounds. A complete neurologic examination, made at this time, disclosed nothing of interest. The Wassermann reaction was negative. The blood pressure was equal to 134 mm. Hg. The leucocyte count, made several times, was normal (from five to six thousand) and the differential count showed normal proportions. Urinalysis showed nothing abnormal.

The patient complained continually of headache, more severe when she sat up, located both in the frontal and occipital regions. Her temperature chart showed but slight variation from the normal; there was usually a rise to 99° in the afternoon; the temperature rarely reached 100° and never rose above. The average pulse rate was eighty, and it was never below seventy, rarely above ninety.

On March 14th (three weeks after the operation upon the sinus) a subtemporal decompression was performed by Dr. Charles Bagley, Jr., who has given us the following notes of his findings:

"March 14th, 1914. Right subtemporal decompression. The usual approach was made through the temporal muscle, and a fairly liberal bony opening made. The dura, when exposed, was found to be tense, and when incised permitted cerebrospinal fluid to spurt freely. There was a great excess of fluid and bulging of the cortex. After evacuation of a considerable amount of the fluid, the cortex ceased bulging. The wound was not drained. The closure was made in the usual manner. Operative recovery was good."

From the time of the decompression operation the patient made a rapid recovery. The choked discs rapidly subsided, the hemorrhages in the right fundus were absorbed, and the veins resumed their normal caliber. The patient no longer complained of headache, and on her discharge from the hospital, April 1st, her vision in right eye had improved to 16/20; in left eye to 16/30. Three months later it was impossible to find any ophthalmoscopic evidence of previous disease of the optic discs, and her vision was 16/16 with each eye.

At the time of this operation we were ignorant of any similar reports. We have since, however, found the article of Auerbach and Alexander[4], in which they described similar case, in which the decompression operation was performed. The article is likewise important for its references to other unoperated cases, and for the thorough discussion of the probable factor in lateral sinus thrombosis responsible for the choked disc.

Auerbach and Alexander's case was that of a man twenty-six years of age who had a cholesteatoma of the left ear for years. He was operated on for lateral sinus thrombosis with choked disc, the symptoms having appeared five days previously. There were cholesteatomatous masses, perisinus abscess and a fistula leading into the lateral sinus. The internal jugular was tied and diseased sinus completely opened. The temperature fell within the next few days, but the choked disc increased and vision decreased so that the patient became completely blind in the right eye and almost blind in the left. The retina showed the appearance of an albuminuric retinitis, but the urine was normal. Three days after the operation a neurologic examination disclosed a paresis of the right abducens and the right facial nerves. There was no headache, no vomiting, no slowness of the pulse. Diagnosis: Meningitis serosa, and therefore it was determined to puncture the right lateral ventricle from Keen's point. The result was negative. The wound was enlarged backwards and the cerebellum was examined for abscess, but without result; there was no improvement in the condition.

Eleven days later a left subtemporal decompression was performed, and on the following day the pupils responded to light. Eight days later the patient could count fingers at one meter, and in another week the vision in right eye was 1/15; left eye, 1/4, with a decrease in the swelling of the disc and the absorption of the extravasations of blood.

The patient died three and a half months later from an erysipelatous infection of the decompression wound.

The authors recognize the great difficulty in explaining choked disc in lateral sinus thrombosis, especially as the choking does not decrease after a successful operation, but increases. They refer to Bartels[5], who has reported such cases, and was unable to give a satisfactory explanation.

Bartels' cases resemble the case of Auerbach and Alexander. The choking of the disc was not as marked before operation, and reached the climax in the second to the fifth week after the operation, and not in a few days after the ligation of the jugular. The vision was not so markedly reduced, and only in one case was there a paresis of the facial and abducens nerves.

Auerbach and Alexander incline to the mechanical explanation of choked disc in cases of sinus thrombosis, as the result of interference with the venous outflow. They refer to the work of Rüdinger, who has shown that the superior longitudinal sinus in more than half the cases turns to the usually larger right lateral sinus, while the straight sinus commonly turns to the left. The two lateral sinuses are unequal, as are the internal jugulars. These facts are corroborated by Macewen.

Spalteholz described the superior longitudinal sinus as frequently emptying its larger right branch into the right lateral sinus, its smaller left branch into the left. Almost as often it empties itself undivided into the right lateral sinus, very rarely into the left. The straight sinus at times enters undivided into the left lateral sinus, but it generally divides, its larger left branch emptying into the left, its smaller right into the right lateral sinus. Toldt and Henrica and Kikuchi have likewise studied these variations, with similar results.

In their own case, Auerbach and Alexander assume that the closure of the left lateral sinus resulted in interference with the venous outflow from the interior of the brain, with a damming up of blood and with consequent edema of the brain, increase of intracranial pressure and its resulting symptoms.

Ruttin[6] gives a similar explanation. He thinks that when the right sinus is closed the surface circulation suffers to a lesser degree than when the left is closed. The choked disc is less marked and altogether milder. Ruttin further thinks that choking of the disc occurs with much more frequency in thrombosis of the lateral sinus than in any other pyogenic brain condition. In twenty-three cases of temporal abscess, he saw choked disc in only three of the cases. In twelve cases of cerebellar abscess, he found choking in two cases, but in thirty cases of sinus thrombosis, he found eight with choked disc. He attributes the choking in cases of cerebellar tumors to the same mechanical obstruction as that causing the condition in lateral sinus thrombosis—viz., an engorgement of the cavernous sinus as the result of a regurgitation of blood from the superior and inferior petrosal sinuses, in turn cut off by obstruction in the lateral sinus, which may be due to pressure, as in the case of tumors, or a thrombus. He is sure that serous meningitis did not exist in his cases, and, therefore, thinks that the condition of the optic nerve, and the facial and abducen paresis sometimes seen, is undoubtedly due to mechanical causes; and this is further substantiated by the occurrence of edema, unilateral headache and other symptoms of engorgement. Why it should occur in one case and not in another can only be conjectural, but may be best explained by the anatomic difference which undoubtedly exists in different individuals.

That tying of the right jugular vein in cases where it is much larger than the left may produce fatal cerebral edema has been shown by Linser[7]. He found two such cases reported, and added one of his own; and he likewise referred to the experiments of Reisinger[8].

It appears to the writers that the explanation of venous engorgement is most satisfactory and that the great variation in vascular distribution accounts for the occurrence of choked disc in one case and its absence in others.

In our first case we are not of the opinion that there was a thrombosis of the lateral sinus before the operation, and in the second, symptoms of thrombosis did not arise until several days after the mastoid operation. Unfortunately, no ophthalmoscopic examination was made before the signs pointing to visual disturbance appeared. But when first seen, the ophthalmoscopic changes were evidently only beginning, and their rapid increase was subsequently watched day by day: therefore the thrombosis in the lateral sinus may but partially interfere with the current of blood, and the complete stoppage may occur only when the jugular vein is tied. This was probably the case in our second patient.

We do not believe that there was a meningitis in either of the cases we have reported. The temperature, the pulse and the general clinical conditions would seem to contradict the existence of any inflammation, however mild. The condition of cerebral and meningeal edema should, therefore, it appears to us, not be termed serous meningitis. In some cases there are other signs of venous stasis beside those in the eye grounds, for in our second case there was definite edema of the face and neck; also the very satisfactory result of the decompression operation in our second case and in Auerbach and Alexander's is still more convincing proof of the noninflammatory character of the edema. Aside from the explanation they give of an interesting condition, these cases serve as a valuable guide in dealing with the condition in the future.

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XLIII.

THE INFERIOR TURBINATE.*

By John A. Cavanaugh, M. D.,

Chicago.

The inferior turbinates are two in number, one in each nasal cavity. They are the largest of the turbinated bodies, attached by their long axis to the lateral wall of the nose in its lower half, from the posterior part of the vestibule to the choana narium; and they extend into the nasal cavity from the lateral wall like an awning. They are made up of bone and soft tissue, and arise from a separate center of ossification which appears between the fifth and seventh month of fetal life. They are concave on their outer and under side, and convex on the upper and inner side. At birth the turbinates closely hug the floor and lateral wall. They are twenty-two to twenty-six millimeters long and four to eight millimeters from the free edge to the lateral wall attachment, their thickness being two to four millimeters. From the opening of the nostril to the anterior end of the turbinate measures eight to ten millimeters. From the cribriform plate to the lower edge ten to twenty millimeters, and to the attached edge fourteen to sixteen millimeters, and the distance from posterior end to anterior wall of eustachian tube is six to eight millimeters.

I am not of the opinion that a part of the inferior turbinate forms a portion of the lateral nasal wall, as all anatomists would have us believe, for I have not been able to find even in the fetus the signs of a suture, which, to my mind, one would find if it helped to form a part of this wall. I believe the bone develops in the rudimentary turbinate and unites to the lateral wall, thus causing a thickening of this area, and with the antrum developing on one side and the nasal cavity on the other causes the lateral wall to thin out and gives it the appearance of a part of the inferior turbinate bone.

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*Read before the Chicago Laryngological and Otological Society, February 16, 1915.

There seems to be but little change in the relations of the inferior turbinates and the surrounding walls from birth to the fourth year, but after this time there is a greater prominence of these bodies. I have measured the thickness of the mucous membrane in children from four to ten years, and found it to vary from one to three millimeters. All turbinates are thickened in the posterior portion. The bony portion of the inferior turbinate at birth is well developed, being from eighteen to twenty millimeters long and from two to four millimeters in width. The free edge of the bone is corrugated and measures about two millimeters thick; as it approaches the attached portion it thins out from one-half to one millimeter in thickness.

The adult inferior turbinate does not vary from that of the child except in its size, being much larger. Its length varies from thirty-eight millimeters to forty-eight millimeters. Some are long and narrow, others short and wide. Some extend into the nasal cavity in a slant from the lateral wall, others in a scroll effect, while others lie almost on a horizontal plane. It is attached to the lateral wall in a curve, the curve being greatest in its anterior attachment. The free edge of the turbinate, with the membrane removed, at the anterior part is from twelve to sixteen millimeters from the floor; the free edge of the posterior part, eight to ten millimeters from the floor. From the cribriform plate to upper attached edge of turbinate, twenty-two to twenty-eight millimeters, and to the free edge, thirty to fifty millimeters.

From the opening of the nostril to the anterior end of the turbinate measures from sixteen to twenty millimeters. The width of the bony part of the turbinate varies from twelve to sixteen millimeters. The free edge of the bony turbinate is from two to three millimeters thick, and is the dense part of this body. The area from this edge to its attachment is very thin and indeed in some specimens entirely absent.

This body is covered by mucous membrane, which is closely adherent at its free border. This membrane varies in thickness from two millimeters to nine millimeters, depending upon existing conditions. The surface of this membrane is composed of several layers of epithelium, the most superficial of which is of the ciliated columnar variety. Below these cells is the basement membrane, which contain small vessels for the nourishment of the epithelium; it is pierced by minute canaliculi and is .010 to .020 millimeter in thickness. Below the basement membrane there is a layer of adenoid tissue, more marked in some cases. Below the adenoid layer are the glands and venous spaces which form the bulk of the mucous membrane. The venous sinuses have rather thick walls which contain considerable muscle tissue. Between these venous channels are numerous bundles of elastic fibers which arise from the superficial layer of the periosteum and end in the adenoid layer. Subdividing and reuniting, these fibers form an elastic network between the glands and cavernous sinuses. Bundles of plain muscle fibers are found around the veins and acini of the glands, as well as running independently through the mucous membrane.

Racemose glands abound in this region, being more numerous in tne posterior part of the turbinate. The cilia have a waving motion toward the pharyngeal space.

The blood supply is derived from branches of the anterior ethmoidal arteries anteriorly and the sphenopalatine artery posteriorly. Small branches are given off of these arteries which run out vertically towards the surface and branch extensively in what is called the adenoid layer, and from these the blood collects into small capillaries which open into the large cavernous spaces. From here the venous blood is carried away by veins which follow the arteries.

According to T. W. E. Rose[1] of Edinburgh, the nerve supply is derived from the two inferior nasal nerves given off from the anterior palatine nerve. These emerge from two minute apertures in the vertical plate of the palate bone; the upper branch at a level between the middle and inferior turbinate, the lower one immediately behind the posterior end of the inferior turbinate. The upper one supplies the superior and innner surface, while the lower supplies the under or antral surface. They enter the posterior end of the turbinate and run forward near the bony surface in company with the arteries and veins. Numerous branches are usually given off, which run more or less obliquely in a very tortuous manner toward the surface.

Henry J. Hertz[2] in his article on the lymphatic system tells us they are very rich in this body, and the capillaries form a network of unequal meshes of irregular size, anastomosing over the entire nasal mucosa and forming a perfectly closed system of vessels. There are two sets of collectors, the anterior and posterior trunks; the anterior anastomoses with the vessels of the external nose and flow to the submaxillary and deep cervical glands. The posterior, which is the most important lymph tract, drains back into the lateral wall of the pharynx and then to the submaxillary, retrolateral, pharyngeal and deep cervical glands.

The physiology of these bodies is thought to be very important factors in warming, moistening and purifying the air, because of the cavernous tissue which forms the greater part.

These bodies have received considerable recognition, but to my mind very little compared to what they should receive, for I believe they mean more to the human economy than most rhinologists would have us believe.

Having studied the anatomy, histology and physiology of these structures, we are now in a position to understand the line of treatment necessary in dealing with their enlargements. Histologically it is a difficult matter to find a truly normal turbinate. Macroscopically I would call a turbinate normal which does not impinge upon a foreign part.

To my mind there are only three types of turbinates which attract our attention, excluding, of course, the malignant and nonmalignant tumor types. These are the intumescent, hypertrophy of the mucous membrane, and hypertrophy of the bony part, the mucous membrane being practically normal.

Personally, I believe the rhinologist is responsible for much of the slaughtering of the inferior turbinate, and I believe it time we should accept a means of caring for these conditions in a way that will not interfere with the normal function of these bodies. I consider it a great exception where an inferior turbinate should be totally removed, and cannot agree with Dr. Dudley S. Reynolds[3] and Drs. E. Moraweck and G. C. Hall,[4] Louisville, in advocating its removal in practically all cases, and of preserving the nasal septum. Moraweck and Hall contend that they often find large turbinates on the side of the concavity and on the other side an atrophy, and when these structures are hypertrophied they should be attacked radically. A turbinate, even though it may look pathologic, will always have some function and should be left untouched. It would be natural to find a large turbinate on the concave side of the septum, and an atrophied one on the convex side, as the turbinate on the concave side is overworked and we have a compensating hypertrophy, while on the obstructed side there is lack of work and, according to the physiologic law, an atrophy.

The septum should always be our point of attack, if by so doing we can preserve a turbinate and accomplish our purpose.

The intumescent or congestive turbinate is a vasomotor relaxation of the muscle fibers of the cavernous spaces, and is the type we are called upon most often to relieve. Many of these cases are due to systemic affections. The anemias play an important part. I have had many cases which impressed upon me the importance of a systemic cause; one especially, a young woman, who had two large intumescent turbinates. I had decided to operate upon them, but in the meantime she was operated on for chronic appendicitis, and after that she told me her nose had opened up. I have seen her since, and the turbinates are as normal as they could be and causing absolutely no trouble.

Operations on the turbinates are many, but the cautery seems to be the one most universally used. I will not discuss the chemical cautery, for, to my mind, it is not worthy of consideration. The galvanocautery is of value only in the turgescent type. There are many advocates of this method, but personally I believe it has many faults. It gives the charlatan an opportunity to use it as a cure-all for nasal diseases, causing destruction of functionating membrane. It destroys normal tissue for some distance from the field of application, and it leaves a large area of nonfunctionating scar tissue with a great liability to a synechia. Drs. E. Fletcher Ingals and Stanton A. Friedberg[5] advocate this procedure, and I believe in the hands of such men the cautery has a place in selected cases.

Dr. Beaman Douglas[6] gives us his histologic findings in cases which he cauterized. He took specimens immediately, thereafter at intervals of forty-eight hours, one hundred hours, three hundred and sixty hours, and after complete healing. He also made like specimens in which an incision had been made by means of a scissors and removed them at corresponding hours to the cauterized specimens.

Dr. Arthur Westerman[7] relates having carried on a like experiment, in which he examined the tissue after the galvanocautery was used, at intervals from one hour to five months.

The findings of these two men were practically the same, the epithelial and basement membrane being destroyed a considerable distance from the point of application of the cautery, while deep in the tissues cauterization was limited more to the area of the application. The basement membrane seemed especially sensitive and easily destroyed and did not redevelop. At the scar area normal mucous membrane was replaced by compact fibrous tissue and the surface covered by a thin layer of epithelial cells. The bone and periosteum were not affected.

Dr. Douglas advises cautery punctures, quarter inches apart, instead of the linear cauterization. After the scissors cut, the epithelium and basement membrane were normal, except where destroyed by the cutting edge. Through the courtesy of Dr. Joseph Beck, I examined a number of histologic specimens of turbinates after cauterization, and found they correspond to the findings of Drs. Douglas and Westerman.

Dr. Henry Horn[8] advocates making a small vertical incision at the anterior end of the turbinate and then separating the tissue from the bone; when this is done he passes the cautery point into the cut and back to the posterior part of the denuded area and then turns on the current and cauterizes from posterior to anterior. But here, again, the radiating heat would destroy too much tissue and defeat our aim.

Dr. A. H. Andrews[9] advises submucous electrolysis, but I believe that also destroys too much of the normal structures.

The sawing or cutting off of a part of the inferior turbinate and leaving bone exposed is unsurgical, for there is no other place in the body where one would allow bone to be exposed and trust to mother nature to cover it by granulations.

Many other methods, such as high frequence, carbon dioxid snow, and crushing are advocated, but time will not permit my speaking of them all. I wish to mention the one method which I believe is the only true surgical procedure to be followed in dealing with the inferior turbinated body, and one which is applicable to all forms of enlargements.

The operation which I perform on the turbinated bodies is similar to those advocated by Dr. Otto Freer[10] and Dr. Sidney Yankauer.[11] I inspect the turbinate carefully before applying adrenalin and cocain, to discern its relations to the surrounding structures; for if a mental picture of this condition is not kept in mind, the operation will fail in purpose, as after shrinkage of the turbinate the picture is changed. If the enlargement is limited to certain areas, deal only with those areas. Use a ten per cent cocain and 1/1,000 adrenalin chlor. If the entire membrane is at fault, whether it be intumescence or hypertrophy, I make an incision from behind forward at the lower and internal surface down to the bone, then a corresponding incision on the lower and outer side, which makes somewhat of a triangular piece of mucous membrane with its apex attached to the bone; with a Freer sharp elevator elevate the mucous membrane from the bone on the outer and inner side for one-eighth of an inch from the anterior surface all along the long axis of the turbinate; then take a Myles alligator biting forceps and bite out a part of the bone with the triangular mucous membrane area, which can be done with but little difficulty. When this is removed the Yankauer crotch forcep is used to draw the cut edges together to make sure that no tension will be necessary on the stitches which pull the flaps together; if there is none, apply stitches with a small needle, using silk instead of catgut, which I find easier to handle and remove.

When this is done, place on the under and inner side a piece of cotton or gauze to aid tissues in apposition and remove it in twenty-four hours. I have packed in some cases without sewing, but the results are not as satisfactory. Where the bone is hypertrophied, proceed as above, but remove more of the bony structure.

This form of dealing with the turbinate is surgical, and after a section is removed, whether it is turgescent, hypertrophy of bone or soft tissue, a structure is left which has practically no connective tissue to interfere with its normal function.

I wish to express my appreciation to Drs. Eycleshymer and Moody of the anatomic department of the University of Illinois for many specimens used in my research work.

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XLIV.

SOME STATISTIC OBSERVATIONS ON OTOLARYNGOLOGIC DISEASES AMONG NEGROES, BASED ON FIFTEEN HUNDRED CASES.

By Dunbar Roy, A. B., M. D.,

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Racial peculiarities must ever remain a characteristic of disease. Whether such be due to climate, to civilization, to environments or hereditary influences, must be left to a further study of the human race.

In considering the diseases embraced under the term otolaryngologic we will find that the above statement is especially true. It is the purpose of this paper to call attention to the diseased conditions found in the upper respiratory tract among the negro race, based upon a study of fifteen hundred cases treated during the last few years at my clinic in the Atlanta College of Medicine, which was formerly the Atlanta College of Physicians and Surgeons.

The study of these cases will show us that the negro race is especially susceptible to certain diseased conditions and almost immune to others. This also is surprising, because the negro race is by no means noted for its cleanliness, and often its mode of living and home environments would lead us to expect a certain prevalence of infections and contagious diseases. A close study of these fifteen hundred cases will show some erroneous statements which have previously been made in reference to certain diseased conditions among the negro race.

That a statistic summary of these may be more clearly understood we have divided them into: (1) Nasal, (2) pharyngeal and laryngeal, (3) aural.

1. Nasal.—It is surprising how few negroes present themselves for a diseased condition of the nasal cavities. Out of

the total of fifteen hundred case only three hundred and forty-one came for consultation on account of some nasal disease. The following is a summary of the pathologic conditions found:

Deviation of the columnar cartilages	1
Atrophic rhinitis (true ozena)	2
Hay fever	2
Acute abscess of the maxillary sinus	2
Deviations of the septum	2
Spurs of the nasal septum	3
Acute rhinitis	15
Purulent rhinitis in children	40
Acute frontal, ethmoidal and sphenoidal sinuitis	30
Chronic ethmoiditis with polypus	45
Syphilis—septum and outer wall	90
Hypertrophic rhinitis (inferior and middle turbinate)	109
Total	341

In studying these cases we are struck with some marked peculiarities. Spurs and deviations of the septum are extremely rare. This I believe to be due to two facts:

First, in the development of the maxillary bones you rarely ever see the high arched and contracted palate which is so often found associated with deviated septums. In the negro this is seldom seen, for a broad face, and consequently a broad palate, is the usual rule. This fact tends to substantiate Mosher's argument as to the importance of the premaxillary ridge in the causation of septum deviations.

In the second place, traumatism as a causal factor in septum deviations is almost universally accepted, but in the negro this is greatly minimized by the presence of a protruding brow and a soft flat resilient nose, which is less likely to show the marks of a violent encounter.

In the full-blooded negro I have never seen a deviation of the septum—i. e., to the point where one might observe a decided bend; and the only two cases which were seen occurred in mulattoes and gave a history of previous traumatism. This I consider quite remarkable that out of fifteen hundred patients only two show a deviated septum.

Acute inflammation of the frontal, ethmoidal and sphenoidal sinuses were seen in five cases, which was also quite remarkable in comparison to similar cases seen among the white patients. This I attribute to the fact that the nasal cavities in the negro are large and roomy, free from obstructions, and consequently offer a perfect drainage for all of the sinuses.

This but exemplifies the fact that acute sinuitis is largely dependent upon the obstructions offered to the natural outflow of the secretions from these cavities. There were only two cases of acute abscess of the maxillary sinus, both of which fully recovered through natural drainage.

Not a single case of chronic maxillary sinuitis was seen, which is also remarkable. While in the South we do not find this condition as frequent perhaps as it occurs in the North, yet we do have a number of cases that even come to operation. Negroes, as a rule, have the most perfect teeth of any race of people, and this may in a large measure be the cause of their freedom from antral disease.

Chronic necrosing ethmoiditis with polypus was found in sixty-five cases. This seems remarkable because the acute sinuitis was so rarely found. In nearly every case this condition was associated with a hypertrophy of the inferior turbinates. This hypertrophy was quite characteristic in that the mucous membrane over the turbinates was thick and leathery, presenting a peculiar gelatinous mulberry appearance, of a decided anemic color. This condition is quite prevalent among all negroes and yields readily to the treatment by means of the electric cautery. This gelatinous hypertrophy, when it involved the middle turbinates, very quickly passed into a condition of polypus.

Hay fever was seen in two cases, which in nowise differed from the same condition in the whites. Inquiry among my colleagues would lead me to say that hay fever is rare among the negroes.

Atrophic rhinitis was seen in only one case, and even here there was an element of doubt, with the possibility of its having a specific basis. This also is at variance with the theory of those who hold that a flat, roomy nose with large nostrils is the type most usually found where atrophic rhinitis exists, and for this reason they hold that such a nose predisposes one to this disease. The facts as stated by me certainly seem to controvert this theory.

Syphilitic lesions were comparatively frequent, and every type of this disease was represented. Unfortunately for this race of people, syphilis seems to have permeated its whole vital system. In a large public clinic one may observe all its various forms, both acquired and hereditary. Gummatous destruction of septum and turbinates, especially the middle, perforations through the floor of the nose and hard palate—these and every other manifold specific lesion can be found.

I wish to call attention to the frequency of purulent rhinitis in the very young. This always had a syphilitic basis and yielded readily to antisyphilitic remedies. This in a measure controverts the theory of those who hold that atrophic rhinitis is dependent upon a previous purulent rhinitis in children. If this was true we would certainly see very many more of the atrophic cases than are really observed in this race of people:

2. Diseases of the pharynx, epipharynx and larynx:

1. Vincent's angina	2
2. Complete atresia of the pharynx and nasopharynx	2
3. Laryngeal paralysis	3
4. Pharyngeal diphtheria	5
5. Syphilis of larynx	10
6. Elongated uvula	11
7. Chronic granular pharyngitis	20
8. Hypertrophy of lingual tonsil	21
9. Laryngeal tuberculosis	23
10. Peritonsillar abscess	50
11. Acute diffused tonsillitis and epipharyngitis	40
12. Acute follicular tonsillitis and epipharyngitis	60
13. Adenoids	96
14. Enlarged faucial tonsils	152
15. Adenoids and enlarged faucial tonsils	296
16. Syphilis of pharynx and epipharynx	270
Total	1061

In this list there will be found only two cases of laryngeal paralysis, and both occurred on the left side as an adductor lesion. They recovered in a few weeks under the use of the iodid of potassium.

I have looked carefully for the various forms of laryngeal paralysis among this race of people because of the prevalence of syphilis in all its forms, especially since optic nerve atrophy is so very common, but so far these are the only case I have ever seen.

Diphtheria is an exceedingly rare disease among the negroes, when we realize the fact that during the last year only seven cases were positively recognized among the negroes in Atlanta out of a negro population of thirty-five thousand. Only five cases were seen by me out of a total of fifteen hundred who consulted the clinic for various throat maladies, and these presented themselves during the last three years. No case of nasal diphtheria was seen, although this form of the disease has been very prevalent in our city during the last few years. If insanitary living can be attributed as a cause for diphtheria, we would certainly expect to find the disease prevalent in the negroes. Consequently, there must be some deciding factor which affects more frequently the white race in this disease. More prominent than everything else stands the prevalence of syphilis among these people. It occurred two hundred and seventy times on the pharynx, tonsils, soft palate and epipharynx, in all its forms from the initial lesion (one case) to a gummatous destruction of all the tissues, and in one case even involving the bony vertebræ. It was by no means uncommon to have these patients présent themselves with an entire destruction of the soft palate and even the hard. Usually these cases never present themselves until a decided destruction has taken place, always relying upon some home remedy to effect a cure and in this way allowing the ravages of syphilis to produce great destruction. It is in these cases of active gummatous destruction that salvarsan produces such marvelous results.

Syphilis of the larynx was not near so frequent, occurring only ten times out of the total number of cases. This differs somewhat from laryngeal tuberculosis, since twenty cases of this disease were seen. Tuberculosis is exceedingly prevalent among the negroes, and is one of the most fatal maladies which occurs among them. It is strange, therefore, that more cases of laryngeal tuberculosis are not seen in a large outdoor clinic, where large numbers of negroes come to be treated for every known disease. Several years ago the statement was frequently made—and, strange to say, by some Southern laryngologists—that adenoids were rarely found among the negroes. The statistics here published would certainly disprove such a contention. The fact is, adenoids are almost as prevalent among this race as among the white, and since the medical inspection of colored schools has been instituted in our city we find our clinics crowded with colored children seeking to be operated upon for the presence of adenoids and enlarged tonsils.

3. Diseases of the Ear.—Aural diseases are not very frequent among the negroes. Out of the total of fifteen hundred patients, only one hundred and twenty-five consulted the clinic for some affection of the ears.

Following is a tabulated list:

1.	Facial paralysis	1
2.	Atresia of the external canal	2
3.	Foreign body in external canal	2
4.	Progressive deafness (socalled dry catarrh of middle ear)	3
5.	Acute suppurative otitis media	5
6.	Chronic catarrhal otitis media	6
7.	Furunculosis of the auditory canal	8
8.	Chronic suppurative otitis media	8
9.	Eczema of the auditory canal	10
10.	Otalgia from reflex causes, teeth, tonsils, etc.	13
11.	Acute catarrhal otitis media	17
12.	Tinnitus with retracted drums	24
13.	Cerumen	26
	Total	125

Middle ear inflammation is comparatively infrequent among the negro race This is also true of the white race in our climate as compared with that which occurs in more northern states. However, middle ear disease is noticeably very rare among negroes, especially that form which is usually spoken of as dry catarrh accompanied with gradually increasing deafness. Out of this tabulated series there were only three cases of this kind, and in looking back on my clinical experience of fifteen years in the same clinic, I can recall but very few negroes who presented themselves on account of progressive deafness. This, to my mind, can be attributed only to unusual free respiratory room in the nasal cavities and the almost absolute freedom from nasal obstructions. This latter condition is by no means a sine qua non as a factor in producing progressive deafness, as the histories of such cases will attest, but it certainly is a contributing cause and cannot be disregarded. The auditory canals in this race are usually very large, and seldom is it even necessary to use a speculum to observe the membrana tympani.

One class of cases mentioned in this list is worthy of comment and are quite numerous. These are the cases where the chief complaint is tinnitus and the only objective symptom found is a retracted drum. Functional testing always fails to elicit any positive results. They are always associated with chronic constipation and its attendant sequela—intestinal toxemia. It is not unusual to elicit the fact that their bowels have not acted for five days. A thorough elimination will speedily cure all these symptoms, which shows that the same is toxic in origin.

In conclusion I wish to say that all of these cases have been studied very carefully, and these observations have been made as representing my own clinical experience. It was stated at the beginning of this paper climatic influences and local environments may possibly play an important rôle in these statistics, which will cause such observations to differ from those of other southern confrères. However, this will certainly add to the sum total of our knowledge and produce further statistic observations along this line by men whose clinical opportunities will afford them ample cause to agree or disagree with my own clinical experience.

XLV.

ACUTE HEMORRHAGIC MASTOIDITIS.*

By Hanau W. Loeb, A. M., M. D.,

St. Louis.

It is rare indeed that an opportunity is afforded of discovering the presence of an acute hemorrhagic mastoiditis. This is only rendered possible by operating while its hemorrhagic nature is still manifest or by postmortem examination where death has supervened from an intercurrent disease or from an early and fatal complication.

According to the usual rule, an infection resulting in hemorrhagic inflammation of the mastoid cells should be of a virulent nature, and a serious result would be anticipated unless intervention is undertaken early in the disease.

The following case furnished an abundance of evidence in this direction: Miss Z. W., a pupil nurse at the Jewish Hospital, St. Louis, was taken on the evening of March 27, 1914, with severe pain in the left ear. She had previously never had any ear trouble whatever, and had never been subject to acute inflammatory troubles of the upper respiratory tract. She had had the usual diseases of childhood, however, without any aural complications.

On examination, the drum in the region of Shrapnell's membrane was slightly red, but not swollen or bulging. During the night, however, the membrana tympani ruptured, and by morning there was an abundance of serosanguinous discharge from the ear. The pain continued and pressure over the mastoid process was almost unbearable.

Meantime, her temperature ranged during the day from 99° at ten o'clock in the forenoon to 101° at nine o'clock in the evening. Pulse rate from ninety to one hundred and fifteen. During the night discharge was exceedingly copious, being still of the serosanguinous character, and the pain continued severe.

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*Read before the American Otological Association, May, 1915.

On the following day, March 29th, the temperature and pulse range were about the same; lower in the morning and higher in the afternoon. The pain continued severe and the discharge became more copious, but maintained its serosanguinous character. Blood count, 15,900, with seventy-eight per cent polynuclear neutrophiles, eleven and one-half per cent lymphocytes, nine and one-half per cent mononuclears and transitionals, one per cent polymorphonuclear eosinophiles. Smears from culture made from ear discharge showed Gram negative diplococci in short chains. Urine, specific gravity 1024, with a trace of albumin.

In view of the continuance of the pain and discharge, the sensitiveness of the mastoid process, the character of the organism, which by this time had been determined to be a diplostreptococcus of the type described by Davis, except for its Gram negative stain, and numerous fatalities in throat infections, also described by Davis, it was determined to exenterate the mastoid cells. This, too, in spite of the fact that less than four days had passed since the primary focus in the middle ear had manifested itself by pain.

After the customary preparation, a simple mastoid operation was made. The soft parts were not swollen and gave no evidence of any inflammatory or septic condition. When the periosteum was elevated the bare bone appeared almost blue in color, as if there had been marked necrosis present. Upon chiseling away the cortex, this was found due to the presence of a reddish blue clot filling every cell that was opened. In fact, it was possible to identify each cell by the color of the clot showing itself through the thin bone. No pus or granulation tissue was found in any of the cells, and the antrum was filled with a clot similar in character to that found in the other mastoid cells. The mastoid was entirely exenterated, the cavity in the bone packed with plain sterile gauze, and the skin incision closed by sutures, except at its lower portion, which was left open for the gauze drain.

Temperature six hours after the operation 102.5°. It continued close to this mark for eight hours, when it began gradually to recede. It rose again to 101° during the second evening after the operation, and to 101.5° on the following day, but after that, during the week following, it gradually approached the normal with slight elevation every evening.

On the day after the operation the blood count showed 31,900 white cells; three days later, 23,000; a week after the operation, 21,700. Blood culture, which was made on the day of the operation, proved to be negative. On the third day after the operation the urine was loaded with red cells, which, however, soon disappeared. The healing was rapid except for a small sinus which persisted for several months.

The bacteriologic report, made by Dr. F. L. Evans, is as follows:

"March 27th. Cultures show medium size opaque colonies, not mucoid and nonhemolytic. Smears from colonies show pure cultures of Gram negative diplococci, which have a tendency to form short chains. Organisms are not encapsulated, but have a slight halo surrounding them. Smears from discharge show diplococci only, no chain formation.

"March 30th. Mastoid operation. Culture from clots in superficial cells gave pure cultures of diplostreptococci. Smears show numerous red cells, pus cells and diplococci. From inner blod clots of the deeper cells both diplostreptococci and staphylococci recovered. Hemolysis capsulation and mucoid character not present.

"April 1st. Diplostreptococci transferred to bouillon.

"April 2nd. Bouillon growth almost exclusively diplococci, a few short chains, however, being found. One-tenth cubic centimeter of bouillon culture injected into ear vein of a rabbit three months old.

"April 7th. Rabbit died during the day. Inflamed area around the site of injection, no sloughing. Culture made from heart's blood and site of injection. Intense hyperemia of all organs.

"April 8th. From heart's blood, Gram negative diplococci with a slight tendency to form chains were recovered. Cultures from site of injection negative.

"April 9th. One-tenth cubic centimeter of recovered diplococci (bouillon culture) injected into knee joint of rabbit.

"April 15th. Area of inoculation shows necrosis, no pus; cultures contaminated. Animal sick.

"April 18th. Rabbit died; cultures show staphylococci and hay bacilli."

It is fair, therefore, to assume that the acute hemorrhagic mastoiditis resulted from a middle ear infection due to the Gram negative diplococci in short chains, such as were found in the original discharge from the middle ear, in the clots from the mastoid cells and the antrum, and which were fatal when cultures of the organisms were injected into a rabbit.

There were in the hospital at the time quite a few cases of diplostreptococcal infection in various manifestations, such as lacunar tonsillitis, acute endocarditis, acute articular rheumatism and purpura hemorrhagica, which will be reported in a later paper.

There are three interesting questions brought up by this case:

1. The microorganism.
2. The hemorrhagic character of the inflammation.
3. The early date of operation.

1. The organism differed from that described by Davis and Rosenow[1] which was encapsulated and Gram positive, two factors which, according to Rosenow, may depend upon cultural conditions within and without the body. It differs materially from the streptococcus mucosus described by Neumann and Ruttin[2]; in fact, the clinical course of the case reported is entirely at variance with that of the type reported by these writers. Alberti[3], who made an extensive study of the bacteriology of acute mastoiditis, does not mention an organism possessing the characteristics of that which is here reported.

2. The hemorrhagic character of the inflammation, according to the general rule, would indicate a virulent type of infection. A fairly detailed study of the literature has failed to reveal instances in which other operators have found a similar picture. The condition present could not have been anticipated by any of the symptoms, unless the uncommonly long duration of the serosanguinous discharge might indicate a hemorrhagic exudate. It was exceedingly

interesting to observe each cell come into view as the clot appeared visible through the thin bony wall of the cell.

It is quite possible that more of these cases of hemorrhagic mastoiditis would be found if operative interference were called for so early in the course of the disease.

3. The justification for operating so early in a mastoid affection may be doubted. However, an infective agent, unquestionably of high virulency, symptoms rapidly increasing in severity, in spite of copious discharge, increasing leucocytosis and the compromising possibility of an acute meningitis, call for an operation in no uncertain tones. The postoperative fever and leucocytosis add weight to the evidence.

I have found it very difficult to get any definite information as to the frequency of early operations in mastoiditis following a first attack of acute suppurative otitis media. However, it is evidently exceedingly uncommon to operate as early as four days after the appearance of the initial symptoms. Several otologists have given instances to me of such early operations, but they have been, in the main, complications of scarlet fever, measles, or grip.

Texier and Levesque[4] describe three types of mastoid disease: subacute, acute, and hyperacute. In the last, tympanic and mastoid cavity are invaded at the same time by a very virulent microbe which may kill the patient by infection, intoxication or meningitis, before pus is formed in the mastoid cells. They have operated on some such cases. They claim operations should be performed two, three or four days after appearance of otitis, but they do not state how early they operated in any of their cases.

Taking the case as a whole, it demonstrates not only the occurrence of an acute hemorrhagic mastoid inflammation of bacterial origin, but also that a mastoid infection may be coincident with, as well as dependent upon, a middle ear inflammation.

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XLVI.

THE TONSIL OPERATION—AN INQUIRY INTO THE ACTUAL RESULTS OBTAINED IN A SERIES OF CASES.

By D. J. Gibb Wishart, B. A., M. D., C. M.,

Toronto.

Until an investigation such as this is well under way, the difficulties which the task presents are not appreciated; and if the number of cases brought into the limelight is not large, and the deductions drawn are liable to be criticised as based upon insufficient data, I can assure you that every effort has been put forth to accumulate the evidence. Hundreds of private patients have been written to, but owing to removals, changes of address in the lapse of years, the fact that many were nonresidents of Toronto, and finally the carelessness of parties addressed, the number of cases that finally submitted themselves for examination is but a small fraction of the number operated upon.

In the hospital clinic there were found to be some twenty-three hundred cases in all. My assistant, Dr. A. D. McKelvey, kindly undertook to get into contact with the cases operated upon in 1906-07, and four hundred and fifty letters were sent out, but the response was so meager that further expenditure of time and money seemed folly. The nonavailability of so much of the material upon which we as laborers in the free wards of our hospitals expend such a wealth of time and skill, when we desire to obtain data for important investigation, is startling, and calls for the inauguration of some definite method by which discharged patients may be required to come under observation at stated intervals.

In my own clinic we have for some years enucleated the tonsils of children. How are we to ascertain beyond the possibility of doubt whether this procedure is followed by evil consequences, unless these cases can be observed and recorded until the age of twenty-five years be reached? Nothing short of this accurate following up of, not a proportion, but all cases, will enable us who are responsible for the methods of treatment pursued in large clinics to get upon firm ground. The personal predilections of this or that operator; the theoretic lucubrations of the scientist upon the economic value of the tonsil in the prepuberty years of life; the experience, however valuable, of the specialized specialist, to whose care fall a large proportion of the failures of the reliable operators, and the mangled botches of the abortionist, can never become reliable data upon which this question may be decided. It is not lack of material, but lack of carefully recorded observation. Could we not as an organization institute a royal commission to take evidence and report its findings? In this continent we undoubtedly vary greatly from our colleagues abroad in our treatment of the tonsil in the child. Our procedure is challenged, our position assailed. Perhaps we are wrong. Let us know beyond a peradventure.

In his article on the "Significance of the Tonsils," our confrère, Dr. D. R. Patterson of Cardiff, whom no one who knows him would ever accuse of being hasty in arriving at his conclusions, or ever unable to give an account of the faith which he holds, concludes with the remark: "They have an essential function in the body, and treatment designed to preserve them as a whole, or in part, so as to enable them again to fulfill it, is based on rational lines."

Can it be that the procedure to be adopted in dealing with diseased tonsils must vary according to the continent in which the lot of the patient is cast? Surely not. And yet the majority of the tonsils we are called upon to enucleate in the Toronto General Hospital, among adults, for recurring tonsillitis, quinsies, heart and joint affections, etc., are in patients who were subjected to the partial operation in Great Britain. It may well be that if Dr. Patterson could have followed his patients into after life, he would have modified the sentence which I have quoted.

I do not feel comfortable in permitting the enucleation of the tonsil in every child where operation appears to be called for, and yet I have not been able to glean anything from the abundant literature provided upon the question which will show me the proper course to pursue.

In order to arrive at some data which would enable me to act with greater confidence, both with regard to my private clientele and in the instruction of my students, I set out upon the examination of cases which had been operated upon since I adopted the enucleation method, ten years ago, and requested the favor of these inspections solely upon the ground of desire for investigation into the scientific value of the procedure adopted. My secretary addressed letters to each patient on the history cards, just as they came, and without any omission, or selection of cases. All the cases which presented themselves have been tabulated without fear or favor, and therefore the record, so far as it goes, is of considerable value. The results have been noted under twelve heads, as follows: Occupation, sex, age at time of operation, years since operation, previous operations, if any, symptoms complained of, effect of operation upon these, anatomic conditions resulting from operation, effect of operation upon voice, effect of operation on general well being, symptoms unrelieved, and remarks.

I desired to obtain some information upon the result of the removal of the tonsils in diminishing or increasing liability to eruptive fevers, but the data obtained were quite unsatisfactory. It will be noted that I have not described the anatomic conditions present at the time of operation, nor stated what was actually done. These did not seem relevant to the inqury. In every instance complete removal of the tonsils, and of whatever else impeded the airway, was the operation performed.

The records compiled are from private patients, twenty-eight cases in all, of which five were obtained by correspondence, and twenty-three examined personally in my office. Those, seventeen in number, obtained from the hospital clinic by Dr. McKelvey, are set in a separate list, but owing to faulty histories, and the stupidity of parents, the records in this division are not complete, except as to present conditions. I will speak of them under three classes: Class 1, under twelve years; Class 2, between twelve and fifteen years; Class 3, eighteen to fifty-two years. The cases are numbered consecutively from 1 to 45. Those examined by myself, numbers 1 to 23; those obtained by letters, numbers 24 to 28; those obtained from the hospital clinic, numbers 29 to 45. Of these, Class 1 included numbers 1 to 10, 24, and 29 to 38, or twenty-one in all. Class 2 includes numbers 11 to 14, 25 to 27, and 39 to 41, or ten in all. Class 3 includes numbers 15 to 23, and 42 to 45, or fourteen in all. If Case 31 had not appeared in answer to inquiry, it would not have been incorporated in this report, as it has no bearing.

AGE AND SEX.

These cases range in age from three to fifty-two years. Up to fifteen years the cases are about equally divided between the sexes, but after puberty the proportion is two males to eleven females. Without an accurate computation of the numbers which have come to operation in each sex, this disproportion in the adult class is without significance.

TIME SINCE OPERATION.

The average time elapsed since operation in Classes 1 and 2 is seven years, and in Class 3, five years. In no instance has less than two years elapsed, and in seventeen cases, eight years or over. So far as Class 1 and Class 2 are concerned, further examinations should be made until the age of twenty-one years is reached, in order to make a final estimate of the actual results, but in Class 3, sufficient time has elapsed to render the conclusions fairly reliable.

EFFECT OF OPERATION UPON SYMPTOMS COMPLAINED OF.

The symptoms cover a wide area—tonsillitis, ten cases; frequent colds, fourteen cases; enlarged glands, three cases; voice defects, eleven cases; swelling and aching of throat, twelve cases; ear affections, ten cases; rheumatic symptoms, four cases; and headache, cough, enuresis, neuralgia, iritis, debility, restlessness, chorea, endocarditis, quinsy, dullness, etc., were complained of in one or more instances. In the private patients the operation was performed by myself, but in the hospital cases there is no record of the persons performing the operations, nor of the method followed.

For some years I have used the scissors to snip the plica, and have freed the upper end of the tonsil by spreading its blades. The tonsil is then drawn into the ring and wire loop of the Beck-Mueller tonsillotome, and the tonsil removed intact.

It will be noted that in Class 1 all the cases were cured, except in Case 9, where, owing doubtless to the failure to remove some small section of the left tonsil, there was an enlargement of this, leading to involvement of the cervical glands seven years after. The same result was obtained in all the cases in Class 2, except that in Case 12 the operation was not early enough to prevent progression of the deafness, and in Case 26, where no information was obtained, the inference is that there was a failure. In Class 3 the results are equally satisfactory. In Case 23 the rheumatic symptoms are still sometimes present, but much less marked. Not only were the symptoms relieved, but it is notable that in nineteen cases the health was decidedly improved, and in no case was it deteriorated. The results of operation upon the symptoms actually present at the time when the consultation took place are so universally good that the operation itself is justified, and it is to be observed, regarding Class 1, that in the private cases when complete removal was effected, the results upon the symptoms are as good as, if not better than, in those among the hospital cases, where portions of the tonsil remain in situ. Nor is it apparent that the leaving of these portions of tonsils behind resulted in any benefit to the children whatever, nor did the removal of the whole tonsil damage in any way those children concerned.

ANATOMIC RESULTS.

In Class 1 (aged three to eleven years) the results are apparently perfect in seven cases, the position of the palate is normal in eleven cases, and in three cases there are minor variations, which may or may not be considered defects. In only one private case is there a real defect, the existence of a small patch of tonsil in the lower left sinus, and this must be held responsible for the existence of swollen glands in the seventh year after operation. In six of the clinical cases there are defects, chiefly the presence of small tags.

In Class 2 (aged twelve to fifteen years) in two cases (Cases 14 and 41) the results are apparently perfect. In Case

12 there is a marked variation in the curve of the palate arch. In Case 39 there is an obliteration of the pillars, and in the remaining three cases there are scars.

In Class 3 (aged twenty-one to fifty-two years) the results are apparently perfect in five cases. In three cases there are minor variations, which may or may not be considered defects. In four cases there are real defects. In the most seriously deformed of these (Case 21) the voice was definitely improved, and in Case 43 a good singing voice has been developed.

There is no doubt that in Classes 1 and 2 the anatomic results are better in those cases where the tonsil was extirpated in its entirety, and therefore there is a cosmetic benefit conferred by the complete operation.

In Class 2 the notes fail to show whether there were adventitious bands of adhesion, due to repeated attacks of inflammation of the tonsils, but the lesions of the pillars found present after operation may undoubtedly be ascribed to such a condition. It would be too great a charity to conclude that this excuse should cover those cases from the hospital clinic, as here the operators and operations may have been equal in number. Again, in Class 3, those cases who had suffered from repeated attacks of tonsillitis are those in which scars and malpositions are most numerous.

It will be remembered that in this city two years ago, Dr. Hudson Makuen of Philadelphia read his paper upon the "Surgery of the Faucial Tonsil as it Relates to the Functions of the Tongue and Soft Palate in the Production of the Voice," a paper which gave rise to much discussion, and in my own case to much searching of heart. Because of this I have carefully inquired into the effect of operation upon the voice in all these cases.

In Class 1 (aged one to eleven years) in only one (Case 24) is there a defect noted. In the one instance in which the present age is sufficient to demonstrate the possession of a singing voice, the young lady is something of a musician under the best of teachers, and is considered to have an excellent voice. In one there is no report. In the remainder the voice is to all appearances without defect.

In Class 2 (aged twelve to fifteen years) the three female cases have each shown evidences of ability to sing, one (Case 12), the daughter of a colleague, has a most delightful voice, and promises to become an artist, and it is to be specially noted that here there is a marked variation in the height of the two sides of the palatal arch. In another (Case 12) there is fusion of the pillars of one side and a large scar, but the voice is all right.

Of the six males, five have good voices, and one is defective.

In Class 3 (aged eighteen to fifty-two years), of the eleven females, only one (Case 21) had a singing voice at the time of operation, and this was notably improved. Another (Case 18), who had lost her singing voice prior to operation, was neither better nor worse. Three (Cases 15, 16 and 19) lost the sense of fatigue in the use of the voice, two (Cases 42 and 43) had developed good voices, and all the rest were either unchanged or had improved.

Here again there is a deformity in the anterior pillars of the one whose singing voice notably improved, and also in Case 43, where the patient, a teacher, has a good singing voice. It may be urged that had the operation been perfect in its anatomic results in every case, the improvement in the singing voice might have been still better, but on the one hand there is proof that voices were improved by operation in spite of cicatrized deformities in the palate arch or pillars, and on the other it is to be noted that in the case (Case 18) where the anatomic result was perfect, the singing voice was not regained.

The effect of extracapsular enucleation upon the singing voice or fatigued voice is, therefore, not prejudicial, but may be considered beneficial.

EFFECT ON GENERAL WELLBEING.

No extended remarks are required in this connection, because it has been for years our experience that the removal of diseased tonsils is attended by marked improvement in the general health of the patient. Still, the testimony here, in practically every one of the cases here recorded, is singularly corroborative.

SYMPTOMS UNRELIEVED.

In fifteen cases these are mentioned; in three of these the nose is evidently the seat of the trouble; in five, the symptom complained of is aside from the question. In two, endocarditis is noted, once (Case 36) as a new symptom, and once (Case 29) as recurring in postoperative attack. The age of this case is worthy of note, and the beneficial effect of removal of the tonsils upon the disease is quite evident. In seven, the nervousness and choreic tendency is to my mind quite independent of the original throat condition.

REMARKS.

Under this heading I would draw your particular attention to Case 28. This lady had diseased tonsils and pyorrhea. It was a question which of these formed the focus for the marked rheumatic diathesis which was causing the patient great and increasing distress. The fact that the cure was brought about by the administration of a pyorrhea vaccine, emphasizes the importance of foci for pus formation being sought out. It is not that the tonsils should have been left alone, but that the vaccine should have been administered at the same time as the operation was performed.

Case 27 is also worthy of note, because operation upon the tonsils brought about the arrest and cure of a marked irregularity in the direction of the teeth, and emphasizes the influence of enlarged tonsils upon the formation of the dental curves, and the apposition of the teeth, a fact not yet sufficiently appreciated by the general practitioner.

Cases 22 and 23, in which frequent attacks of tonsillitis occurred in conjunction with acute inflammatory rheumatism, are of interest. In the first the result is a cure, and in the second there has been one slight attack of iritis, and in addition rheumatic pains in the throat and neuritis in one leg.

I have not thought it within the scope of this short article to refer to the observations of various operators upon the conditions which they have noted subsequent to operation, because as a rule their remarks refer to immediate and not to remote conditions, but it is pertinent to this inquiry to make two exceptions. The first bears out my own observation of the effect of scars, etc., upon the singing voice, and the second introduces a postoperative result which fortunately none of my cases exhibit. Dudley, in "Effect Upon Speech and Voice of the Removal of the Tonsils," mentions a case where a singer had tonsils removed, and although great irregularity of the palate arch was produced, there was improvement of the speaking voice, and no disturbance of the singing voice.

Stuckey, in "After-effects of Radical Tonsillectomy," mentions two cases where cicatricial contraction of the pillars caused discomfort in swallowing, and another in which tinnitus was produced by traction on the fossa of Rosenmüller.

As I stated at the commencement, this record contains too few cases to be conclusive in any direction, but should it be followed by similar reports from other operators who have inspected their own work, at some period sufficiently far removed from the date of operation, in the bulk the result will be illuminating, and point the road to sound practice.

Patient	Occupation	Sex	Age	Yrs. Sin. Op.	Prev. Oper.	Symptoms Complained of	Effect of Operation on Symptoms	Anatomic Conditions After Operation	Effect of Operation on Voice	Effect on General Health	Symptoms Unrelieved	Remarks
1	School.	F.	4	9		Frequent colds.	Cured.	Perfect.	Good.	Excellent.		
2		M.	5	5		Not stated.		Perfect.	Good.			
3	School.	F.	6	3		Earache, sore throat.	Cured.	Perfect.	Good.	In wonderful health since.		
4	School.	M.	6	9		Constant cough, nasal voice, enlarged cervical glands.	Cured.	Palate perfect. Anterior pillars are merged into wall. No puckering.	Good.	Very different since.		
5	School.	F.	9	3		Frequent colds, restlessness.	Cured.	Perfect.	Good.	Health better. Frequent sore throats.		

6	School.	F.	9	3		Earache and cervical glands.	Cured.	Perfect.	Good.	Health better.		
7	School.	F.	9	3		Earache, frequent colds, husky voice.	Cured.	Perfect.	Good.	Health indifferent.	Nervousness choreic.	
8	School.	M.	9	4		Constant cold in head, headaches, general debility.	Cured.	Palate O. K. Anterior pillars are merged into wall. No puckering.	Good.	Good.	Granular pharyngitis.	
9	School	F.	10	7		Earache, glands enlarged, throat swells and aches.	Earache and throat cured. Left glands swollen last winter. Cured.	Position perfect, small patch of tonsils in lower left sinus.	A very pretty singing voice.	A wonderful difference. Grew eighteen inches in fourteen months.		
10	School	M.	9	10		Disturbed sleep, deafness, running ears, enuresis, swollen throat, nasal voice.	Cured.	Sinus shallow.	Sings in a choir. No difficulty.	Health very good.		

Patient	Occupation	Sex	Age	Yrs. Sin. Op.	Prev. Oper.	Symptoms Complained of	Effect of Operation on Symptoms	Anatomic Conditions After Operation	Effect of Operation on Voice	Effect on General Health	Symptoms Unrelieved	Remarks
11	School.	M.	12	5		Frequent soreness and swelling of throat.	Cured.	Small remains of tonsil in upper right. Slight puckering scar in upper left.	Good.	Much improved health.		
12	School.	F.	12	7		Nasal voice, tonsils swell frequently, crypts fill up. Slight deafness.	Subsequently treated for deafness.	No scars or puckering. Left posterior pillars perfect, but only seen with mirror. Marked variation in curve of palate.	Has developed a magnificent voice, powerful.	Excellent health.	Deafness.	Mother is very deaf.
13	School.	F.	14	8		Colds in head, headaches. Sore throat. Urates abundant.	Cured.	Right pillars are fused above, and a large scar below. Left perfect.	Sings a lot with ease and comfort, but not strong voice. Has two and one-half octaves, four notes higher than usual.	Health fair.	Indigestion, rheumatic pains on damp days. Colds on chest. Turbinals edematous.	

14	School.	F.	14	3		Frequent tonsillitis. Throat swells, hoarseness, nasal voice.	Cured.	Perfect.	Sings. Voice improved one hundred per cent.	Never well previously, now greatly improved in every way.		
15	Librarian.	F.	21	2		Frequent sore throat.	Cured.	Left tonsil sinus shallow.	Voice less fatigued after use.	Health improved since.		
16	School teacher.	F.	24	5		Fatigue and fullness in throat, especially in damp weather. Tonsillitis off and on. Voice affected.	Quite relieved.	Perfect.	Still teacher. Voice equal to all necessities. Teaches singing.	Health excellent. Greatly improved.		
17	Maid.	F.	25	6	1	One cold on top of another. Ears run at times.	Cured.	Uvula absent, otherwise perfect.	Clearer.	Health improved.	No rheumatism.	
18	Stenographer.	F.	28	8		Recurrent pains in throat. Throat fatigues easily. Is obliged to give up singing. Poor health.	Results satisfactory. Would have it done again in view of result.	Perfect.	Voice neither worse nor better. Has not taken up singing since.	Good.	Uric acid.	Slight attacks of pain in throat since.

Patient	Occupation	Sex	Age	Yrs. Sin. Op.	Prev. Oper.	Symptoms Complained of	Effect of Operation on Symptoms	Anatomic Conditions After Operation	Effect of Operation on Voice	Effect on General Health	Symptoms Unrelieved	Remarks
19	Stenographer.	F.	29	4	1	Tonsillitis; throat aches after reading aloud.	Cured.	Palate arch perfect. Right pillar concealed. Sinus is shallow on left.	No fatigue even in using.	No change.		
20	Housewife.	F.	35	4		Repeated bad colds and sore throat.	Cured.	Perfect.	Excellent.	No change.	Bronchitis.	
21	Sings a great deal. Is a choir leader.	F.	34	9		Five attacks of tonsillitis this winter. Neuralgia.	Cured.	Anterior pillars notched and deformed.	Sings with greater ease, and possibly better quality.	Became a different person, and lost her "nerves."	Some neuralgia (much less).	
22	Business.	M.	36	4		Tonsillitis every winter for five years, severely. Just recovering from an attack of acute rheumatism.	Not an attack since.	Puckered cicatrix at bottom of each tonsil sinus, which are both deep.	Good.	Greatly improved in general health.		

23	Housekeeper.	F.	41	8		Tonsillitis very frequent and severe. Four attacks of iritis. Acute inflammatory rheumatism once. Chronic rheumatism.	None since. Once slightly.	Pillars on right fused, with scar.	Good.	Decidedly better. Neuritis in one leg. Slight sore throat.		If needful to get the benefit obtained, would repeat operation.
24	Nursery.	M.	3	4	1	Snuffling, snoring, etc. Tonsillitis.	Some aching off and on. Cured.	Not seen.	Huskiness.	Much improved in health.	Mouth breathing.	
25	School.	F.	11	4		Semiidiotic appearance. Mouth breather.	"The child was a lot better in every way."	Not seen.				
26	School.	M.	14	9		Catches cold easily, nasal voice, tonsillitis.		Not seen.	Voice muffled.		Attacks of sore throat.	

Patient	Occupation	Sex	Age	Yrs. Sin. Op.	Prev. Oper.	Symptoms Complained of	Effect of Operation on Symptoms	Anatomic Conditions After Operation	Effect of Operation on Voice	Effect on General Health	Symptoms Unrelieved	Remarks
27	School.	M.	15	8		Frequent colds in head, tonsillitis.	Both cured.	Not seen.	Clear, with plenty of volume.	Markedly and permanently beneficial.		Teeth, which had showed marked irregularity, came into line without any resort to pressure. Subsequent operation for adenoids required.
28	Housewife.	F.	52	2		Diseased tonsils, supposed a focus for rheumatic diathesis.		Not seen.	Unaltered.	No effect. The throat has given some trouble since operation.	Patient unrelieved until six months later. A vaccine prepared from gums of patient suffering from pyorrhea was administered.	

29	Infant.	F.	3	6		Chorea, endocarditis.	Improved.			Improved.	Endocarditis once since.	
30		M.	5	8		Difficulty in breathing.	Good.	Adhesion right tag posterior pillar, scar on palate.	Good.	Good.		
31		F.	5	8		Obstruction, adenoid only.	Good.	Tonsils present.	O. K.	O. K.		
32	School.	F.	6	8		School sent her.	Good.	Shortening of palate and left posterior pillar.	Good.	O. K.		
33	School.	M.	7	7		Dull. Mouth breather.	Good.	Remains of tonsil, inferior fossæ.		Good.		
34	School.	M.	8	8					Lost uvula.	O. K.	Colds in head.	
35	School.	M.	9	7		Nocturnal mouth breather.	Good.	Double tag and inferior fossæ.	Improved.	Good.		

Patient	Occupation	Sex	Age	Yrs. Since	Prev. Oper.	Symptoms Complained of	Effect of Operation on Symptoms	Anatomic Conditions After Operation	Effect of Operation on Voice	Effect on General Health	Symptoms Unrelieved	Remarks
36	School.	M.	9	8		Mouth breather.	Good.	Perfect.		Improved.	Endocarditis.	Turbinate hypertrophied.
37	School.	M.	10	7			Good.	Left clean, with slight puckering right tag.		O. K.		
38	School.	F.	11	7		Dull. Mouth breather.	Good.	Remains of tonsil. Inferior base of both.		Good.		
39	School.	M.	12	7	*1	Frequent colds.	Better.	Excellent. Obliteration of pillars.	Good.	Good.		
40	School.	M.	12	8	†1	Sore throat. Obstruction.	Good.	Adhesion on left side at scar of pillars.	O. K.	O. K.		

41	School.	M.	12	8		Dullness. Obstruction.	Good.	Good.	O. K.	O. K.		
42	Student.	F.	18	4	*1	Nocturnal mouth breather. Frequent coryza.	Excellent.	Perfect.	Advanced pupil in singing. Voice improved.	O. K.		
43	Teacher.	M.	19	4		Frequent quinsy.	Excellent.	Scarring of left anterior pillar and small tag.	Good singing voice.	Good.	Occasional cold in the head.	Deflected septum.
44	School.	F.	19	7		Intermittent mouth breather.	Good.	Improved.	Improved.	Improved.	Sore throat.	
45	Shipper.	M.	23	8		Frequent colds. Tonsillitis. Difficulty in breathing.	Continues good.	Small tag in right tonsillar pillar.	Good.	Good.	Colds in head.	Deviated septum.

*Adenoid. †Partially removed in England.

XLVII.

REPORT OF A CASE OF TRAUMATIC MASTOIDITIS.*

By C. Johnstone Imperatori, M. D.,

New York.

V. F., six months old, of Bohemian parents, presents the following history:

His family and previous history is negative as regards its bearing on the case and is, therefore, omitted. He has been breast fed and has always been in good health up to the present time.

On the morning of February 9, 1915, he fell from a table a distance of three feet, striking his head behind the ear—on the left side. He did not become unconscious, nor did he vomit following the fall. There was no blood from the ear, nose or mouth, and while he remained awake part of the afternoon, his mother said he did not cry until evening. He seemed to be slightly dazed. During the night he nursed as usual, and continued to do so regularly for two days following the injury.

He was seen by a physician immediately following the fall, but nothing was noted until the third day after the accident, when a swelling developed behind the left ear. At this time he had fever and refused his feedings. This condition continued, the enlargement behind the ear increasing in size, until the time of entrance to the Babies' Ward of the Red Cross Hospital, six days following the injury.

The physical examination of the child, made at this time by the attending pediatrician, Dr. Pisek, showed a well nourished child, with a postauricular swelling on the left side. Otherwise everything else was normal. On examination of the left ear a bulging drum was seen. It appeared a deep purple in color. The drum was incised and considerable dark blood and some stringy mucopurulent material came out. A smear on examination microscopically showed pneumococci.

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*Read before the New York Academy of Medicine, Section on Otology, March 12, 1915.

A diagnosis of mastoiditis with a subperiosteal abscess was made, and the child was operated upon that afternoon with the following operative findings:

A simple mastoid operation was done. On exposing the cortex of the temporal bone in the region of the antrum, a line of fracture was seen running posteriorly in a horizontal direction to a necrotic spot, which was just in front of the squamomastoid suture. The line of fracture took a general direction, as that of the German base line, and was about two centimeters in length. The necrotic spot was about one-half centimeter in diameter. The mastoid cavity was filled with detritus, and there was considerable pus in and about the antrum. Some of the cells contained dark brown material. The fracture did not extend through the inner plate. Examination of the necrotic spot, after removal of the rest of the cortex, showed granulations on the dura, which was exposed a little more than one-half centimeter. The exact situation of this area was at the upper posterior superior angle of the mastoid cavity. The mastoid cavity was of a normal infantile type, with the sinus and middle cranial fossa in the normal location.

POSTOPERATIVE HISTORY.

General condition seemed good, nursed fairly well, stools were normal and there was no vomiting. Temperature fluctuated between 100° and 101° for the first three days after the operation. Then there was a period of four days with the temperature ranging between 100° and 103°. This was followed by another three days of decline of the highest point in the twenty-four hours and resembling the first three-day period. On the tenth day after the operation the temperature reached normal. It remained normal for about a day and then a characteristic septic type of temperature ensued, the range being from subnormal to 105° within the twenty-four hours. The pulse varied from 120 to 150, with respirations between 28 and 40.

A blood culture taken on the eighteenth day following the injury, and the first day of the high temperature, was negative. A second blood culture, taken four days later, was also negative. Leucocytosis averaged about 17,000 total and sixty per cent polynuclears. During the stay in the hospital there was a gradual loss in weight of one pound and five ounces. On admission the child weighed sixteen pounds and ten ounces. Von Pirquet reaction and the urine were negative.

On March 6th, nineteen days after the original operation and twenty-five days after the injury, taking the temperature as a guide, it was decided to do an exploratory operation on the sinus and if necessary resect the jugular.

The operative findings were as follows: On exposing the cortex, well back posteriorly and below the sinus in the region of the posterior lateral fontanelle, there was an area of bone destruction over one centimeter in diameter, mainly involving the occipital bone. The dura had no granulations on it, but it appeared a paler blue than the surrounding dura. It was thought that very likely here was a point of entrance of the infection and it was decided to explore the underlying brain. Two incisions were made in the dura and the underlying cerebellum explored with negative results. The bone covering the whole length of the sinus in the mastoid cavity was found to be necrotic and the sinus was uncovered down to the bulb. The sinus wall was found bathed in pus. The wall appeared pale in contrast to the surrounding dura. The wall was incised just below the knee, the incision being about two centimeters in length. There was free bleeding from the torcular and bulbar ends. The inner wall of the sinus was everted and closely examined for a mural clot or phlebitis, but the characteristic smooth and glistening appearance of a normal sinus presented.

There was very little change following the operation; the child died sixty hours later. Unfortunately autopsy was refused.

Regarding the diagnosis, it would seem that this case can be considered as one of traumatic origin, complicated possibly by a jugular bulb thrombosis.

It would seem from the temperature that this was a case of venous poisoning, and that this was the cause of death. Although there was a rather persistent cough, repeated examinations of the chest and X-ray were negative. Two X-rays of the skull, taken for other lines of fracture and done by different men, were negative.

Two days before death there was a slight Kernig, but no cervical opisthotonos or Babinski. Lumbar puncture was negative. Regarding the two negative blood cultures, it is possible that the small amount of blood obtained was the reason for not getting positive results.

XLVIII.

FACIAL CONTRACTIONS DURING THE RADICAL MASTOID OPERATION.*

By Charles E. Perkins, M. D.,

New York City.

We are all interested in facial twitching during the radical mastoid operation, and any experience which throws light on that subject should be of interest. It is for that reason that I desire to present this subject for your consideration.

It is a well known fact that mechanical irritation of the facial nerve results in facial contractions. These are reported to the operator by the anesthetist and form a very valuable source of information. A thorough knowledge of their significance becomes of great importance to the otologist.

1. If the nerve is completely severed there will be one, and only one, contraction, which will involve all of the muscles supplied by the facial. The anesthetist will be able to see that both the muscles at the angle of the mouth and those around the eye are involved. The patient will, of course, have complete facial paralysis from that moment, and it is very liable to be permanent. One cannot deny the possibility of healing taking place between the divided ends of the nerve, especially if they are cleanly cut, as with a sharp chisel, and there is no retraction or bone jammed between them. There is, however, so little probability of the conditions existing that favor a reunion of the nerve filaments, that should partial resumption of the function of the nerve occur, we would be more apt to assume that the original injury had resulted in partial division rather than that the nerve had been totally severed and that reunion had taken place. One can conceive that it is possible to have more than one facial contraction with total division of the nerve, the twitching being caused by

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mechanical irritation of the distal end of the nerve, but there is very little probability of this happening. The only way to prevent this first form of facial twitching from occurring is, of course, avoidance of injury to the nerve through a good technic, a thorough knowledge of the anatomy of the bone with its variations, and a dry field.

2. In a second type of case the nerve is injured by the instruments of the surgeon, but not completely severed. This takes place more readily if the nerve is bare, but the tympanic wall of the fallopian canal is such a thin shell of bone that it is easily removed with the curette. There will be one or more twitches, as the case may be, but one should be enough to warn the surgeon. The patient usually emerges from the anesthetic with partial facial paralysis which rapidly becomes complete through inflammation of the remaining part of the nerve. This partially clears up in time. The improvement usually begins after six weeks, but may be much longer deferred, as in the following case, which was under the care of one of my colleagues, and as well as the other cases reported on the service of Dr. Dench at the New York Eye and Ear Infirmary:

S. B., male, thirty-two years old. Chronic discharge from the ear for five years. Had ossiculectomy without improvement. Radical mastoid July 29, 1910; no twitching. Cavity dermatized except in the tympanum, especially in the region of the oval and round windows. Here there were granulations from which discharge persisted until ten months later, when it was determined to remove these and insert a Thiersch graft. While this was being done with the curette there was one well marked facial contraction elicited when the curette was in the region of the oval window. Patient emerged from ether with nearly complete facial paralysis, rapidly becoming complete. The cavity entirely healed, but the paralysis persisted for two years, when it began to clear up. The improvement continued until the two sides of the face are nearly alike. He can close his eye quite well, the movements around the mouth are not quite as free as on the opposite side, and he is unable to produce the lines on the forehead. It is difficult to account for this improvement, which is surely extraordinary, without assuming the occurrence of some regeneration of the nerve fibers.

3. A third type is where the nerve is bare. This is generally in the horizontal part of its course, either as a developmental anomaly or the bone over the nerve has been destroyed by necrosis or erosion from cholesteatoma. If the bare nerve is touched with a probe it usually produces a facial contraction. The pressure of the gauze sponge as it is packed into the middle ear after the bridge has been taken down may lead to the same result. The operator is fortunate when this happens, as he is then forewarned and able to avoid injury to the nerve. Illustrating this type is the following case:

A girl of sixteen years had aural discharge for years; the odor was foul and the membrana tympani destroyed. A radical operation was performed and cholesteatomous masses were found. After I had taken down the bridge the first time the assistant packed the gauze sponge into the cavity there was a well marked twitch. This was repeated throughout the operation every time the gauze was packed against that part of the internal tympanic wall where the fallopian canal is situated. In cleaning up the cavity great care not to injure the nerve was taken. The cavity was packed with gauze most too firmly. Light packing in these cases is advisable. Patient emerged from ether free from paralysis. In twelve hours weakness of facial muscles was noticed, and in forty-eight hours paralysis was complete. It lasted six weeks, then cleared up perfectly. During the healing process the patient developed interstitial keratitis, and then we noticed she had Hutchinson teeth. She, however, made a good recovery, but on account of my temerity in dealing with tympanic granulations the cavity is not all that could be desired. She remains now, after four years, free from further paralysis with a dry cavity.

4. A fourth type where twitching is caused by traction on the chorda tympani is illustrated by the following case:

J. B., male, had discharge from right ear for thirteen years. Membrana tensa was destroyed and internal tympanic wall dermatized. Discharge came from antrum through sinus beneath Shrapnell's membrane; malleus present. Radical operation January 15, 1915. After the antrum was opened the first time the gauze was packed into the cavity a well marked twitch occurred. This took place as often as this procedure was repeated until the bridge was taken down, when gauze could be packed into the antrum without twitching. The removal of the bridge released a mass of granulation tissue and débris which fell into the lower part of the tympanic cavity, any interference with which, either by curette or gauze sponge, resulted in facial contractions. Where this mass was finally removed, a white filament was found attached posteriorly. The patient was allowed to partially emerge from ether, when seventh nerve was found to be intact, as shown by movements of the face. This filament was therefore the chorda tympani, although much larger than the normal nerve. No dehiscence in the fallopian canal could be found. The patient recovered without facial paralysis. During the healing process every time the applicator was inserted in the region of the promontory he complained of a severe shock in his tongue. This shock did not appear to be of gustatory nature, and was due, no doubt, to irritation of the central end of the chorda. The twitchings in the early part of the operation are to be explained by assuming traction on the nerve. There was a cholesteatomatous mass in the aditus and tympanic vault. When the gauze was packed into the antrum, pressure upon this resulted and caused bulging of Shrapnell's membrane, perhaps also displacement of the ossicles with consequent traction on the nerve. When the nerve was severed anteriorly, as it was when the bridge was taken down, traction produced in this manner became impossible and twitching upon sponging in the antrum ceased.

When we come to consider the fact that we have to deal with the chorda tympani in every radical operation, it seems singular that we have so few cases in which its disturbance is accompanied by facial contractions. While in a number of my operations there has been a slight twitch which I have been inclined to attribute to disturbance of the chorda, the above case has been the first one in which evidence of this sequence has been conclusive. It seems, therefore, that some unusual change in the nerve itself is necessary, and also perhaps some anatomic peculiarity of the osseous canals, before this can take place. The chorda is involved in the chronic suppurating ears in fully fifty per cent of cases, as will readily be seen by tests of the taste.

If there is a neuritis with absorption of nerve elements and formation of new connective tissue, we can readily see that this might lead in some cases to the formation of a comparatively strong nerve—one capable of sustaining sufficient traction to cause mechanical irritation of the facial, presuming the anatomic conditions to be such as would be favorable for the transmission of this force. We may assume that in some cases at least this change in the nerve would extend to its facial origin.

Now, if for any reason the iter chordæ posterius should be of larger caliber than usual, and at the same time shorter as a developmental anomaly, the conditions would be ideal to allow force exerted upon the tympanic chorda to be transmitted to the facial. I am satisfied from examination of dry bones and dissections that these variations do occur; moreover, an inflammation of the nerve might lead first to swelling with enlargement of the iter, and from subsequent connective tissue changes to a diminution in its size, thus resulting in a small tough nerve lying comparatively free in its canal.

Finally, it is possible that some peculiarity of the facial connection itself might exist that would conduce to transmission of mechanic irritation through the chorda, as, for instance, a lateral connection producing rotation of the facial upon chordal traction. All of these conditions would, of course, but seldom be present, or even enough of them to allow the phenomenon under discussion to occur; hence, facial contractions during the radical operation arising from force exerted upon the chorda tympani are comparatively rare.

In conclusion, would say that it is not claimed that facial paralysis occurs only in those cases which have presented a facial contraction. In a small number of cases either the contraction has occurred and has not been noticed by the anesthetist, or it is possible that it has not taken place. Personal experience and observation, however, lead me to believe that injury to the nerve manifests itself first as a facial contraction, and if the anesthetist is on the lookout he will see and report it. This certainly will be an aid to the surgeon, but should not be relied upon by him to the extent of making him feel one particle less responsible for the effect of every move made in the region of the facial nerve.

XLIX.

THE DIFFERENTIAL DIAGNOSIS OF LARYNGEAL MOTOR PARALYSIS.*

By Otto J. Stein, M. D.,

Chicago.

In all disturbances of motor stability of the larynx, one must remember that there may be present an individual state of either spasm, paresis or paralysis, and that there may also be a concomitant state of two or all of these manifestations. As a paresis is but an incomplete state of paralysis, they necessarily are often associated and therefore considered together.

In classifying paralyses, account must be taken of the variety, causes, anatomic relationship and associated symptoms.

All motor paralyses of the laryngeal muscles originate from causes located centrally or peripherally, the latter constituting by far the greater number. Those of central origin may have their cause situated in the cortex or in the motor tract, like the internal capsule, pyramidal lobes, pons or medulla. The most frequent central causes are tumors, bulbar paralysis, multiple sclerosis, amyotrophic lateral sclerosis, general paresis, syringomyelia, apoplexy, softening and syphilis, which includes tabes. The latter disease is the most important of all causes within the medulla. The two laryngeal symptoms in tabes are crises and paralysis. The crises are occasioned by a prickling and tickling sensation in the larynx, causing coughing and often suffocating attacks with crowing inspiratory tones and, at times, loss of consciousness. The voice may be husky or aphonic. These symptoms are due to sensory disturbances of the larynx, incoordination of the laryngeal muscles and spasm of the glottis. Laryngeal motor paralysis of the larynx due to tabes may exist without any history of a crisis. It may be the only recognizable symptom of the disease for a long time, and is often a very early symptom. But when associated with such other well known symptoms of tabes as contracted pupils, reacting only to accommodation, areas of skin anesthesia, reduced or absent patellar reflex, difficult coordination, especially with closed eyes, lightning-like pains about the waist or down the legs and anuria, the diagnosis is assured.

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In syringomyelia there is both motor and sensory disturbances of the larynx, but there also is associated involvement of the pharynx, soft palate and tongue. Laryngeal crises like in tabes have not been recognized in this disease. In a general way where there is an association of a tachycardia and a paralysis of one or more cranial nerves, in addition to the bilateral laryngeal paralysis, it is highly significant of a central disease. In hysteric aphonia we have the psychic type of paralysis, the center for which is the cortex. The sudden onset and recovery, the hesitating way the cords attempt to approach one another in attempted speech, the phonic cough and laugh and also voice when asleep and dreaming aloud, make the diagnosis clear.

As already mentioned, the paralyses of peripheral origin constitute the greater number of cases recognized. The paralysis is due to some interruption in the transmission or reception of the motor impulse and is caused by contiguous pressure, inflammation or degeneration of the nerve elements. The pressure may be occasioned by a tumor, gland, aneurism, adhesions, foreign body, etc. The inflammatory and degenerative cases may be due to trauma, disease, drugs, etc. In all cases, other than those due to a mashing or complete severence of the recurrent nerve, the paralysis of the muscles follows in a certain order, namely: The abductors are affected first (the cricoarytenoidei postici), the internal tensors (the thyroarytenoidei interni), and finally the adductors (the crico-arytenoidei laterales), which Semon attributes to a selective biologic change within the nerve fibers. Notable in peripheral paralysis is the atrophy of the muscles. Where atrophy of the paralyzed abductor muscles can be demonstrated, and especially if attended by a paralysis of the internal tensors, there is sufficient evidence that a paralysis and not a spasm is present.

In spasm of the glottis the attacks of difficult breathing are at times severe and may go to cyanosis and unconsciousness, but ordinarily they are of short duration. The attacks are recurring in type, especially under certain circumstances like an emotional state, etc. In some cases there is an accompanying spasm of neighboring muscles, like those of the pharynx, palate and esophagus. Sometimes the hyperkinesia alternates with a hypokinesia as well as a parakinesia, so that where there exists violent dyspnea with a peculiar shrill cry, there follows aphonia and normal breathing or any combination of these conditions. Hence the variability in these symptoms is significant of spasm. It must be remembered that voice may be absent even though the cords approximate. This may be due to a cortical irritation, but it is usually a purely functional disorder. Such is the mogiphonia of Frankel or the dysphonia spastica of Schnitzler, and they are disorders of occupation, for under normal conditions the voice is all right, but, like in writer's cramp, for instance, the excessive use of the voice under trying circumstances will result in aphonia. A good way to determine a spasm is to have the patient take a note, while under mirror observation, and sustain it as long as the examiner does, which is to the end of the breath, and it will be noted that a deep involuntary inspiration is taken with separation of the cords, thus showing the central reflex action on the abductors.

In some cases of ataxia (tabes) or following diphtheria, and even in peripheral pneumogastric involvement, there may be present a spasm and a paralysis at the same time, a contraction on one side and a relaxation on the other side.

Sometimes an ankylosis of the cricoarytenoid articulation may so immobilize the cord as to simulate a paralysis, and in particular one should be alert to the presence of an infiltration such as results in malignancy. Cicatrices may also bind the joint or the cord in a way to obliterate the voice or interfere with free breathing.

In case of myasthenia or other general diseases like severe anemia, great exhaustion, or loss of blood, there may be a very weak action of the cords amounting to a paresis. Whenever the internal tensors and arytenoid muscles alone are involved the cause, most likely, is purely local

It is of noteworthy importance to remember that there may be complete absence of all throat symptoms even though a paralysis be present. Paralysis due to an enlarged or diseased thyroid gland, an aneurism and the like is frequently overlooked and not recognized, simply because the larynx is not systematically examined. If the larynx of every patient were carefully examined with a mirror many paralyses would be found that otherwise pass observation.

This information is of particular importance to every surgeon before operating upon a goiter, for if a paralysis due to pressure of the gland is not discovered until after the operation, it may be assumed that the nerve was injured at the operation. The laryngologist may render invaluable service by diagnosticating a paralysis of the cords due to tabes, goiter and aneurism, even when no other noticeable symptoms of the disorder exist.

In paralysis of the tensor muscles one can see, besides the concave or wavy outline of the cord's edge, a depressed appearance on inspiration and an elevated appearance on phonation, this being due to the action of the air current on the relaxed cord. In this connection I will refer to a case, recently presented by Samuel Iglauer before a meeting of the American Laryngological, Rhinological and Otological Society held at Cincinnati, in which the cords approximated during inspiration and separated on expiration. Dr. Iglauer explains this anomalous action of the cords as due to the inspiratory current of air drawing the cords together and the expiratory current separating them. Others have accounted for the condition due to a perverted nerve action—that is to say, the stimulus for the abductors is transferred to the adductors. Frankel was the first to describe this condition. and Moritz Schmidt devotes considerable space to a description of various vicarious actions of the cords. The patient that Dr. Iglauer presented was wearing a tracheotomy tube for a bilateral abductor paralysis, and if examined by means of a Hays pharyngoscope, with closed mouth and nostrils, the vicarious action of the cords was said to disappear.

L.

A CASE OF ACUTE MENINGITIS ASSOCIATED WITH ACUTE SUPPURATIVE OTITIS MEDIA, BOTH PRODUCED BY STREPTOCOCCUS MUCOSUS CAPSULATUS.*

By Robert L. Loughran, M. D.,

New York City.

Ralph Hausrath, age ten years, was admitted to the Manhattan Eye, Ear and Throat Hospital on the evening of December 24, 1914. On December 21st he came home from school at noon, complaining of pain in the right ear and discomfort in his stomach. He was given a dose of castor oil, and on the following day was feeling very much better. He slept all of the next night, and on December 24th he left boarding school in the early morning for his Christmas vacation, feeling bright and cheerful. Those in charge of him at the school state that the gastric disturbance had cleared up, and that he did not complain of his ear. To quote from their letter: "When he left here we felt perfectly contented and at ease, only we were so sorry he looked so 'drawn.' Of course, we attribted that to his stomach, as he said his ear was better." And again: "The morning he left here he was bright, ate heartily, and was talking and relating stories. He was in his usual cheerful and talkative mood, only he looked rather drawn. He did not complain of his ear. He said he did not have an earache. It merely went 'tic-a-tic.' It was relieved by a hot water bottle. We cannot understand why, if he had an abscess, it came on so quickly. He had no fever except about half an hour before the castor oil operated."

Upon his arrival in New York that afternoon he complained of a general headache and discomfort in his ear, which he described as a feeling like his heart after he had been running. He was seen by his family physician and referred to the hospital. When seen in the evening he presented a drum membrane indicating the beginning of an acute exudative otitis media, congested and bulging, but not excessively so. The mastoid was negative. The drum was incised and a small amount of serosanguinous fluid evacuated. Temperature, 103°; pulse, 112; respirations, 24. During the next day his temperature dropped to 101°, and rose to 103° in the evening. The ear was comfortable and the discharge serosanguinous and slight in amount. He complained of pronounced general headache. This was relieved to a certain extent by bromids. His neck was slightly rigid, but this was explained by his saying that it made his headache worse to move his head. On the 26th the temperature rose to 105° in the evening, and the discharge became purulent and profuse. There were no earache and no mastoid tenderness. Headache persisted. On the 27th his morning temperature was 103°; at noon, 104.6°; pulse, 117; respirations, 24. When seen by me at noon he presented an entirely new picture. His neck was rigid and retracted—this having come on during the morning. Further examination elicited the fact that he had a pronounced Babinski and Kernig symptoms. Physically there was no change: he still complained of his headache. There was no change in the ear condition, except that upon deep pressure over the antrum the boy said it felt a little sore. A blood count taken during the morning showed a leucocytosis of 22,000, with a polynuclear percentage of ninety-one. A lumbar puncture was immediately done, and a turbid fluid under moderate pressure withdrawn. This was immediately reported upon, and showed in "direct smear the streptococcus mucosus capsulatus in large numbers. Lactic acid present; sugar negative." This report from the laboratory was accompanied by another which should have been sent down the day previously—the advent of Christmas day having interfered with the regular schedule. It showed that a culture of the fluid evacuated at the time the drum was incised contained the streptococcus capsulatus.

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*Read before the New York Academy of Medicine, Section on Otology, March 12, 1915.

Feeling that the otitis must have been the primary focus of the meningitis, an immediate mastoid operation was performed, which demonstrated the fact that the infection had not advanced through the mastoid cells. The mastoid was negative except for a small amount of serosanguinous fluid in the antrum and some congestion of the surrounding cells. The tegmen antri was removed and the dura found to be normal at that point. The tegmen tympani was removed as far forward as possible and the dura found to be in the same normal condition.

There were no acute mastoiditis and no inflammatory condition of the dura in relation to the mastoid or middle ear as far as could be seen. Following the operation the patient went through the regular course of acute meningitis, with no spinal symptoms. He was perfectly conscious for three days and then passed into a gradually increasing delirium, and died on the fifth day. His temperature ranged around 104°, with two drops, one to 100.4° and another to 100°. An autopsy was not obtainable.

This case is reported as one primarily of acute meningitis in which the symptoms of acute otitis were the first to present themselves. It would have been reasonable to suppose that the meningitis following later was but an infection of meninges through the mastoid. The operation disproved this. We had, therefore, to deal with an acute meningitis followed by an acute otitis, both produced by the streptococcus capsulatus, and both independent of each other.

And the case is of especial value as a demonstration of the necessity of always keeping well in mind the infection producing an otitis media, and the seriousness of the possible complications when the mucosus capsulatus coccus is the agent at work.

LI.

A CASE OF ACUTE EXACERBATION OF A CHRONIC MASTOIDITIS WITH CHOLESTEATOMA, EXTENSIVE EPIDURAL ABSCESS, PURULENT PACHYMENINGITIS, WITH EXPLORATORY INCISION OF THE DURA AND LATERAL SINUS—RECOVERY.*

By Robert L. Loughran, M. D.,

New York City.

Arthur Ferguson, age twenty-five years. Admitted to the Manhattan Hospital on August 6, 1914. Two days previously he had presented himself to the clinic, complaining of an excruciating pain in the right ear of one week's duration. He explained that he wanted the ear "cut" and the pain would be relieved. The condition had occurred several times before, and an incision of the drum had relieved it. Otoscopic examination showed an exacerbation of a chronic purulent otitis media, and furthermore demonstrated the fact that the drum was absent, and the ear was filled with dense scar tissue. This was edematous and deeply congested. There was no pus following the incision, but bleeding was profuse. On the following day he came into the hospital, the pain not having been relieved. Following admission he had a chill, and the pain seemed referred more to the whole side of the head rather than to the ear. There was no aural discharge. He was partially delirious; temperature, 104.4°; pulse, 120; respirations, 24. During the night he had another chill, lasting seven minutes, and his temperature rose to 106°, which dropped in six hours to 102°. Just before being sent to the operating room the blood count showed a leucocytosis of 16,000 and a polynuclear percentage of eighty-five.

A radical mastoid operation was performed, and a well organized cholesteatoma found filling the antrum and middle ear cavity. There was considerable excavation of the mastoid cells, but no exposure of the dura or sinus. All the cells were exenterated without exposing either.

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*Read before the New York Academy of Medicine, Section on Otology, March 12, 1915.

The walls of the operated cavity looked perfectly healthy except for one dark appearing spot about one-eighth of an inch in diameter in the posterior portion of the inner wall of the antrum, adjacent to the tegmen and posterior to the external semicircular canal. This was cleaned out apparently to our satisfaction. A blood culture taken at this time was negative after forty-eight hours. He was returned to bed in good condition, but during the night was extremely restless, and during the next day complained of a pronounced general headache.

On the 9th the temperature ranged around 102°; pulse around 100; respirations, 22. He had a chill in the afternoon and there was considerable pain in the head. He was very restless during the night.

On the 10th a full dressing was done and the wound looked well at that stage, except for the dark spot spoken of before, and the discharge had a characteristic odor of the colon bacillus. During that day the temperature was 103.4° at 6 a. m., and 100.6° at noon, and 104.8° at 3 p. m., when he had a chill. Later it dropped to 102°. During the night he was extremely restless and delirious at times.

On the next day, the 11th, the temperature at 6 a. m. was 105°; at 9 a. m., 100.4°; at 6 p. m., 104°; pulse 120. A blood culture taken during the day proved to be negative after forty-eight hours, and a spinal puncture developed no microorganisms.

On the 12th there was a rise to 105.2°, which dropped in six hours to 100.3°. In the morning he had a chill. Examination of the blood for malaria was made. During the day he became very restless and noisy and had to have a restraining sheet applied. Dressings each day showed an effort at repair, but a peculiar sweetish odor remained. He was very restless during the night.

On the 13th at 8 a. m. his temperature was 104°; at noon, 100°, and at 6 p. m., 105°. He was irrational, and complained of severe headache. In the evening he had a chill. During the day an examination of his eyes showed some injection of the fundus vessels, especially the right, otherwise the discs were normal.

On the 14th the symptoms remained very much the same, while the temperature excursion was between 99.6° and 105.8°; and back to 100° in an interval of twenty hours.

During all this time his condition remained remarkably good, with a pulse never higher than one hundred and twenty, and usually one hundred, with respirations from twenty to twenty-four, and while the temperature picture was clearly that of a sinus involvement, the meningeal symptoms were entirely too prominent to be ignored. Other factors also entered to obscure the diagnosis. There were no physical manifestations of a meningitis other than the headache and delirium. The spinal fluid was negative; no help could be obtained from an examination of the eyes. Furthermore, the repeated blood cultures were negative, and so having exhausted all suggestions made by several consultants, who agreed on the probability of a sinus thrombosis against the opinion of the attending physician, who by this time had begun to suspect that his first operation had not been as complete as it might have been, the patient was again taken to the operating room. The first bite of the curette confirmed his suspicions. Attacking the bone at the point of the dark spot before referred to, and removing the roof of the antrum, a flourishing epidural abscess was exposed to view.

This occupied a position in the floor of the middle fossa, about an inch in diameter. On further examination the overlying dura was found to be in a state of acute purulent inflammation, exceedingly thickened and edematous and of a distinct brownish green color. An effort was made to remove sufficient bone to outline the extent of this area of purulent pachymeningitis, and all of the floor of the middle fossa in association with the mastoid antrum and cells, along with the roof of the middle ear cavity, was taken away, as well as a goodly portion of the squamous portion forming the lateral wall. The lateral sinus was exposed back to the occipital suture, and still there was present edematous green dura covered with a seropurulent exudate.

For the purpose of determining positively what seemed must exist, pus beneath the dura, the dura was incised along the margin between the lateral and inferior surface of the temporosphenoidal lobe for the distance of an inch, and a grooved director introduced for at least an inch in all directions. The blood vessels of the pia were found to be injected and dilated, but no pus or fluid was found. This incision was closed with silk sutures. This demonstrated the fact of the edema of the dura, for it was found to be fully one-sixteenth of an inch thick. Likewise, on account of the marked thickening of the sinus wall, its green color, the exudate covering it and the temperature curve, all suggesting the possibility of a clot within the sinus, it was opened for a distance of an inch, but no clot and no pus were found—there was no interference with the blood current. The sinus dura was found to be in the same condition as that in the surrounding area. There being no indication for further exploration, the sinus was closed by pressure pads and the whole cavity packed with iodoform gauze. It may be of interest to note that a culture of a sinus taken at the operation demonstrated the presence of the bacillus pyocyaneus.

The patient was returned from the operating room in good condition and very boisterous. He had a comfortable night, and from then on proceeded to get well—no pain, no headache, with comfortable nights. He was out of bed on the thirteenth day following the operation. His temperature the day after the operation was 103°, and after that gradually declined to under 100°, where it remained.

The first dressing on the second day showed an effort at repair, the sloughing outer coat of the dura gradually coming away and its place being taken by healthy granulation tissue. A week before his discharge from the hospital the skin was closed with silkworm sutures, but subsequently broke down in the center and then healed by granulation. The middle ear since contains a small granulation over the dura that presents in the uncovered roof.

This case clearly demonstrates the advisability of the exploratory exposure of dura and sinus in cases of suspicion, and the possibility of an epidural abscess and purulent pachymeningitis giving the temperature curve and symptoms of a sinus involvement.

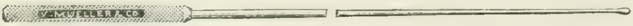
LII.

A LABYRINTH PROBE.

By Frank R. Spencer, A. B., M. D.,

Boulder, Colorado.

Realizing the demand for a labyrinth probe, to be used in surgical procedures upon the labyrinth, and in searching for a fistula of the internal ear, the author devised the probe as illustrated. This may be identical with the one which Dr. Erich Ruttin uses and which is illustrated in his book upon the labyrinth, so the author doesn't claim any originality for this. Since Ruttin's probe cannot be secured in this country, it seems best to have one on the market.



The Spencer Labyrinth Probe.

The probe has been reduced in size so that the delicate olive tip will readily enter the semicircular canals or small fistulæ in the same. This has been thoroughly tried and found small enough for the semicircular canals. It is made of pure silver and can easily be bent to any desired angle. The total length is fourteen and two-tenths centimeters and the maximum diameter of the olive tip is six-tenths of a millimeter. The illustration shows the actual size.

SOCIETY PROCEEDINGS.

NEW YORK ACADEMY OF MEDICINE, SECTION ON OTOLOGY.

Meeting of March 12, 1915.

Four Cases Showing the Results of Modified Radical Operation After One Year.

Dr. Hugh B. Blackwell: These four cases were cases of chronic discharge of the middle ear.

1. The first patient, for two years and some months prior to operation, had suffered from a chronic running ear with much pain and dizziness. He was treated at the Manhattan Eye, Ear and Throat Hospital for some weeks, and finally, fourteen weeks ago, had an operation performed.

2. The second patient had a double otitis media purulenta chronica—in one ear for two years and in the other for six months—prior to operation. She was operated upon fourteen months ago, and has now no pain, but a certain amount of dizziness still remains.

3. The third patient, a young woman, had also a double otitis media chronica, the left ear having been affected for two years. The ear had a nasty, fluctuating discharge. In all the cases the discharge was very profuse. This patient had been treated for some weeks previous to the operation, with no improvement.

4. The last patient had a chronic running ear for two years before the operation, with no pain. The operation was performed a year and nine months ago.

The same operation has been performed on some eighty-odd cases of mastoiditis where a modified form of blood clot had been employed, and at the conclusion of the operation a plastic flap was cut and the mastoid wound packed with gauze. The operation consists in first cleaning up the mastoid and then taking down the mastoid wall at the epitympanic ring. In one of these cases last year the epitympanic ring was broken through. The attic of the ear is cleaned out and the ossicles are exposed without disturbing them. Any granulations in the ear are removed at the same time. The plastic flap is cut and the wound dressed as usual.

The operation is somewhat more rapid than the usual radical operation; the cavity is lined with epithelium in a short time. The hearing is not in any way affected by the operation. In none of the cases presented has the patient had any impairment of hearing; indeed, three of them think that the hearing is somewhat improved. Their hearing was certainly very good, as could be demonstrated by anyone who wished to test it.

Dr. Blackwell said that he claimed no originality for the procedure. Dr. Bryant had read a paper on the subject some years ago. It was very much the same as the Heath operation, though the attic is somewhat more exposed. There seems to be a field for the procedure rather than for the radical operation, which has fallen somewhat into disfavor for such wide use. Perhaps in some instances that would otherwise be operated upon by the radical operation, this procedure would give the desired results of a dry ear with the added advantage of a functionating ear.

Salivary Fistula Complicating a Simple Mastoidectomy.

Dr. Cornelius Doremus Van Wagenen: H. K., male, admitted to the service of Dr. Arthur B. Duel, at the Manhattan Eye, Ear and Throat Hospital, July 27, 1914, suffering from an acute middle ear and mastoid suppuration, induced and developed by four days of prolonged surf bathing. Myringotomy and a twenty-four hour observation affording no relief, a left simple mastoidectomy was performed. A particularly long, wide, and pneumatic mastoid was uncovered and found to be extensively involved by a streptococcus invasion. Not only was a posterior right angled incision requisite, but also a prolongation downward of the usual curved postauricular incision, in order to thoroughly expose and exenterate all purulent foci, especially in the elongated tip. Twenty-four hours later a rectal temperature of 106° F. was recorded, but the patient merely "felt hot." Dr. Van Wagenen then left the service on his vacation, but during his absence the patient passed through an erysipelatous attack and made an uneventful recovery. He was discharged from observation in the first days of September. In the following December he returned to the hospital for a submucous resection for left deviation of the nasal septum. On recovery he first noted the presence of moisture on the left side of the neck, and attributed it to his nasal operation. This fluid discharge, varying in amount, only obtained during yet always accompanied mastication, and became so troublesome at times as to require it to be caught in a handkerchief applied to the neck. Two weeks ago today he gave a practical demonstration in the hospital clinic by munching an apple. Later, an attempt to supply fluid to Dr. James G. Dwyer for examination failed, owing to salivary exhaustion induced by a hearty meal one hour before the test. Returning, starved, the next day, he responded promptly to the test meal. This plan has been followed tonight for purposes of demonstration. (Successful demonstration on eating some sandwiches.)

In the March, 1914, issue of the *Annals of Otology*, Dr. Corrado Canesteo, Institute on Special Surgical Pathology of the Royal Institute of Genoa, reports five cases of parotid fistula. Several theories, based on traumatism, on inflammation, are therein advanced in explanation of this rare occurrence. As pointed out in the article, the gland is usually considered outside the surgical field of a simple mastoidectomy. It would seem that both theories might be advanced in any explanation of this particular case—i. e., that a primary traumatism happened during the course of the surgical attack on the tip; that an inflammation walled off a portion of the gland with the establishment of a fistulous tract in the forming scar tissue; that this tract became temporarily obliterated through the pressure of the retaining head bandage and later became reestablished, partly through resolution of the overlying cicatrix, partly through the pressure of retained secretion periodically stimulated to activity by the act of mastication. The unusual downward thrust of the mastoid tip, with high insertion of the sternocleidomastoid muscle, to which the gland is in part adherent, a possible anomalous relation of the gland thereto, and the mechanical pull exerted on the cicatrix during the maxillary movements, may be classed as further contributions to this remote result.

While the cases embraced in Dr. Canesteo's report seemed to yield promptly to a variety of treatment—i. e., injection of iodin, theromautery, etc.—this fistulous tract has so far defied every probe, even the use of a fine horsehair introduced under a lens. These obliterating methods will be applied, but, in the event of failure, excision of the tract with attempted primary union will be practiced.

DISCUSSION.

DR. DWYER said that the analysis showed a perfectly normal saliva.

Chronic Labyrinthitis Due to Cholesteatoma.

DR. L. M. HURD: The patient, an Italian, aged eighteen years, had otitis media suppurativa chronica on the left side, following measles in infancy. When she came under observation on November 27, 1914, the ear was discharging and she complained of severe vertiginous headaches on the left side. One week before, a facial paralysis had developed, followed by increased headache. The external auditory canal was stenosed; mastoid not tender; all hearing tests, negative. Rotation to right, fifteen seconds; left, three. Caloric test, negative. Temperature, 99°; pulse, 81.

Operation, December 1, 1914. Sinus, superficial, and less than half an inch behind aural canal. There was a cholesteatomatous mass one-third of an inch below the cortex filling the mastoid and tympanum. The facial nerve was exposed at the angle and I uncovered from it there downward for a quarter of an inch. The sinus was exposed, but the inner posterior table was left. There was a mass of granulations found in the solid triangle an eighth of an inch in diameter. The semicircular canals were soft, but there was no fluid pus. These were removed with the curette, exposing the dura down to the internal meatus. The stapes were removed and found to be roughened. The bone between the round and oval windows was removed. The carotid canal was eroded, exposing the artery. The operation occupied an hour and twenty minutes.

The next day the patient suffered from frontal headache, vertigo and vomiting. On December 3d the headache was better. On December 4th there was partial action of the facial nerve. On December 8th a Pansa flap was made and the wound was sutured.

December 21st a small skin graft was applied. On January 25th the ear was dry.

Results in Fracture of Base, Rupture of Middle Meningeal Artery, Otitis Media Purulenta Acuta Developing and Infecting Area of Fracture.

Dr. L. M. Hurd: The patient was an old man who fell down stairs on February 10, 1914, and fractured the base of his skull. Two days after the injury he was taken to a general surgical hospital and a decompression operation was done in the parietal region. The meningeal artery had been ruptured. This was tied off. He remained in the hospital about twelve days, and was sent home in a semiconscious condition.

He remained at home for about two weeks, when a swelling developed over the area of the operation and he came under Dr. Hurd's observation. At that period he was at times wildly delirious and had to be restrained much of the time; at other times he was calm.

An incision was made beyond the swelling, and a large flap was turned down. There was a large collection of pus on the dura, which came from the direction of the tympanum. A radical mastoid operation was done, and a sequestrum about half an inch in length was found, running from the edge of the decompression to the tegmen antri. The sequestrum was removed, the wound sewed up, and the patient made a perfect recovery.

He had no memory, however, from the time of the operation until about eight weeks afterward. One of his delusions was that he would not eat, and for a time he had to be fed forcibly.

According to the history given by his son, he remained more or less delirious until about a week before Easter (April 5, 1914), when he began to improve gradually, and became wholly rational in about two weeks. At present he can read all day, though he complains of a rumbling noise in his ear.

Dr. Hurd said that until this evening he had not seen the patient for a year, and had never seen him excepting when he was delirious.

Replying to a query about aphasia, Dr. Hurd said that the man had no aphasia, so far as he could tell, when discharged from the hospital.

DISCUSSION.

Dr. Kopetzky asked whether any labyrinthine tests were made.

Dr. Hurd replied: No.

Dr. Kopetzky asked whether he had understood that the labyrinthine tests were made and showed no reaction when patient was turned. What about the turning effect on the healthy labyrinth of the opposite side?

Dr. Hurd replied: Fifteen seconds; no reaction at all.

Paper: A Case of Acute Meningitis, Associated With Acute Suppurative Otitis Media, Both Produced by Streptococcus Mucosus Capsulatus.*

By Robert L. Loughran, M. D.,

New York City.

A Case of Acute Exacerbation of a Chronic Mastoiditis With Cholesteatoma, Extensive Epidural Abscess, Purulent Pachymeningitis With Exploratory Incision of the Dura and Lateral Sinus—Recovery.†

By Robert L. Loughran, M. D.,

New York City.

DISCUSSION.

Dr. Dwyer said that in the last two years he had seen twenty-two cases of purulent meningitis and had kept complete records of them. Most of these infections were of the streptocococus mucosus type. A paper reporting them was in course of preparation.

Dr. Loughran was of the opinion that in the first case reported by him the otitis was secondary to the meningitis. This would be very unusual. In view of the cases he (Dr. Dwyer) had seen, the meningitis was due to the otitis. In four of his cases that came to autopsy, direct extension could be demonstrated microscopically, although macroscopically the dura was normal and the path of infection could not be traced. In the case under discussion, if granulation tissue was present in the antrum, no doubt a culture would have demonstrated the presence of the organism at the time of operation.

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*See page 673. †See page 676.

Dr. Dwyer was of the opinion that the spinal fluid in this case had been turbid for days and that, as usual in infection with this type of organism in meningitis, the clinical symptoms associated with meningitis were either absent, or present only just before death.

In the second case, he did not think a diagnosis of purulent meningitis should be made. It was a case of extensive pachymeningitis, but not meningitis in the usually accepted term, and had not become generalized. He did not think a diagnosis of purulent meningitis should be made unless there are cerebrospinal changes.

DR. KOPETZKY agreed with Dr. Dwyer in the summing up of the second case, and said that he laid much stress upon the symptom of headache which that case presented. He recalled the cases of ambulatory meningitis reported by Dr. Berens at the American Otological and also at the Triological Society, in which the most characteristic symptom, and in fact the only symptom until the terminal stage was reached, was persistent headache.

The other case should not be termed a purulent meningitis, and even though the extent of the area involved was very marked, it was really only a pachymeningitis externa.

Speaking of the other cases of Dr. Loughran, he pointed out the significance of experimental work on meningitis, and stated that in the majority of instances the meninges are infected by the hematogenous route. In the majority of autopsies where meningitis had taken place prior to death the greatest pus collections are not found adjacent to the affected ear, which would be the case if the meninges were infected by contiguity. In the case cited he did not think the otitis was independent of the meningitis, but that it was the result of the otitis, and simply belonged to the group of cases to which Dr. Berens had given the name ambulatory meningitis.

DR. LOUGHRAN said that he would like to ask Dr. Dwyer if another point in the history could have had any influence in the possible invasion of the infection.

The boy had been vaccinated on the first of October and had a very severe reaction. He was sick in bed for a week. He had spent the summer in camp in Canada and had come back to school in the fall in good shape, although he had been losing some weight.

In regard to the headache, the boy described it by saying, "That his whole head ached." From the fact that acute meningitis produced by the streptococcus mucosus capsulatus frequently develops without any apparent evidence of a point of invasion, and from the fact that in this case there was a mild otitis, it seemed that the acute otitis may have been simply an incident associated with the development of the meningitis and not the actual cause of it.

Report of a Case of Cavernous Sinus Thrombosis.

DR. S. J. KOPETZKY: S. M., aged three years, male, after an attack of otitis media, four weeks later developed acute mastoiditis, for which simple mastoidectomy was performed February 1st, at the Manhattan Eye and Ear Hospital. For fifteen days pulse, temperature and respiration and general condition showed nothing abnormal. There had been no exposure of sinus or dura at the operation. On February 15th sudden rise of temperature to 106°. Blood count and blood culture taken and both negative. The clinical picture presented by the drop and subsequent rise of temperature and the absence of all other igns made the case look, from the clinical side, as one of sinus thrombosis, and without waiting for further reports from the laboratory, the jugular was resected and the sinus examined. No clot was demonstrable and the jugular vein was found normal (subsequent report). On February 18th a lumbar puncture was taken and the fluid was found normal except that the copper reduction was absent. On February 19th another lumbar puncture gave a similar finding. A suspicion that meningitis was developing was then entertained. Meanwhile other symptoms developed: marked edema of both eyes, swelling of the conjunctiva and typical septic temperature. The eye grounds reports as normal. Another blood culture now was found positive after forty-eight hours—streptococci—and a cerebrospinal fluid became absolutely negative, the copper reduction being present and normal in its reaction. The patient died. No autopsy was permitted.

In commenting on the case, Dr. Kopetzky said that conceivably a thrombus had extended from the bulb into the petrosal and from there into cavernous sinus. He did not believe it a case of meningitis.

Paper: Report of a Case of Traumatic Mastoiditis.*

By C. Johnstone Imperatori, M. D.,

New York City.

DISCUSSION.

Dr. Imperatori said that he did not go any further on account of the condition of the patient. Taking into consideration the age of the child, and knowing the difficulty in some cases in finding the jugular in children, it seemed best to discontinue the operation. He agreed with Dr. Kopetzky regarding the blood culture. There should be at least five cubic centimeters, and if possible ten cubic centimeters, of blood secured; this blood is then spread through one hundred and fifty cubic centimeters of culture media.

Paper: Infection of the Ear With Vincent's Miscroorganisms—Report of Sixteen Cases.†

By J. A. Mulholland, M. D.,

New York City.

DISCUSSION.

Dr. Kenefick congratulated Dr. Mulholland on the manner in which he had presented the subject of Vincent's spirillum. While in former years there was only an occasional case at the Foundling Asylum which fits the description of those recently studied, still some must have occurred from time to time which went on to a fatal ending without having its true nature recognized. These cases of Vincent's infection are very interesting to study. Recently he had seen several cases in adults, affecting the pharynx, which very nearly terminated fatally. The cases which Dr. Mulholland had reported, of course, occurred in infants, and, moreover, in institutional infants, where the infection is especially destructive. The picture is one which, once seen, is never forgotten, and the odor once smelled is not soon forgotten, for it certainly suggests an extraordinary infection. Necrosis in the external canal is often extensive, affecting the soft tissues and bone and spreading into the mastoid and surrounding tissue. He had in the past operated on these cases in the hospital, and had always regretted making any new opening through which the infection could extend. In the usual mastoid operation, for instance, the end was hastened by the fresh wounds made. There was no means by which the terrible destruction could be controlled. Now, if it is found that in salvarsan we have an agent by which it can be controlled, the future is bright for these cases. Dr. Mulholland's statistics were certainly most encouraging.

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*See page 660.

†See page 485.

In the beginning the salvarsan was tried in the powder form. Dr. Mulholland would doubtless state whether he used it in the powder form without venous injection, or whether he depended on the venous injection to control the infection. Dr. Kenefick said that he had recently learned that the application of salvarsan in a five per cent mixture with olive oil was very effective, and if this form can be tried out and found effective, it will be a most acceptable method of treatment—better by far than intravenous injection, which is not at all an agreeable procedure with infants, and especially in female infants, for it is almost sure to leave a scar which lasts even late in life.

The lesson taught by Dr. Mulholland's report is that in any case which presents in auditory canal, middle ear, mastoid or pharynx an unusual destruction of tissue with an odor of extraordinary necrosis and which refuses to be cleaned up by antiseptic irrigation or the usual methods indicated, we should hunt for the Vincent spirillum; and, having found it, it is to be hoped that salvarsan locally applied will be effective without calling for intravenous injection.

Dr. Kenefick said that it was his impression that in past years at the Foundling Hospital this organism had been grafted upon very virulent infections of the ear following infectious diseases, especially scarlet fever, and that in future Dr. Mulholland may be able to give more information on this point. There is no doubt about its contagiousness, and it will be interesting to find whether it occurs more frequently in suppurative ear conditions following the infectious diseases.

Dr. Mulholland said that in his opinion it is quite common, but that it is not generally recognized. The average man seeing a bad throat will take a culture, and the culture will not show the organism. One has to take a smear. He had received a report from the Michigan State Board of Health, showing that six hundred and eighty-seven swabs were sent in for suspected diphtheria, and of these there were two hundred and forty-two cases of true diphtheria, or twenty-eight per cent. The Klebs-Loeffler bacillus was found in two hundred and forty-two cases; and of these six hundred and eighty-seven cases there were one hundred and seventy-eight cases in which the Vincent organism was present. Here in New York a man will take a culture and send it down for examination, and if the report comes back negative he is delighted and will never give it a thought.

The point that Dr. Kenefick had brought up of its being contagious was certainly true in institutional life. One never sees it in a normal healthy child, but institutional life favors its development. In the New York Foundling Hospital, where there are eight hundred children, it is frequently found; but there are many children out, and none of these have it so far as known.

Mr. Mulholland said that they were using salvarsan in doses of two-tenths of a gram up to the age of five years. It had been tried with glycerin but not with olive oil. Most satisfactory results were using it intravenously.

Dr. Dwyer, replying to Dr. Wilson's inquiry, said that they had intended later to look into the question of whether the bacillus was of the bovine or the human type.

NEW YORK ACADEMY OF MEDICINE, SECTION ON OTOLOGY.

Meeting of April 9, 1915.

Otitis Media Purulenta Chronica With Labyrinthine Fistula.—Symptoms Relieved by Radical Operation.

Dr. Isidore Friesner: D. F., aged nineteen years. Early in September this patient came to Dr. Phillips' clinic at the Manhattan Eye, Ear and Throat Hospital. He gave the following history: The right ear had been discharging since childhood. The discharge was foul, but not abundant. Recently the discharge had increased somewhat, and there were occasional attacks of vertigo and shooting pains behind the ear.

Examination.—Left ear, normal. Right ear, no edema or tenderness of mastoid. External auditory canal broad. The lower portion of the inner tympanic wall epidermatized. In the upper portion, part of the hammer handle present adherent to the inner tympanic wall. In the region of the posterior fold a few small pale granulations protruded from the attic. From these granulations a drop of not very foul pus oozed.

Functional Examination.—Weber to right. Rinné, right, negative; left, positive. Schwabach, right prolonged. With the noise apparatus in left ear he could hear soft whisper (right) at several feet. Spontaneous rotatory nystagmus to both sides; more marked to right (diseased ear). Rotation to right, nystagmus eighteen degrees; rotation to left, nystagmus seventeen degrees. Caloric, right positive. Fistula test positive and typical in so far as compression aroused a nystagmus to the diseased ear. Aspiration was negative.

September 29, 1914, radical mastoid operation. Sinus very superficial and rather far forward. Antrum and aditus contained neither pus nor cholesteatoma. The bone of the inner aditus wall was softened, and in this region a few pale granulations were found. In the posterior limb of the external semicircular canal there was a large fistula. The canal was open for probably a third of its circumference. Aside from an intercurrent erysipelas, which, however, did not interfere with the healing of the postauricular wound, recovery was uneventful.

There was no postoperative increase in the spontaneous nystagmus, and the vertigo disappeared rapidly after the operation.

October 31, 1914, about one month after operation, hearing (tested with noise apparatus) as before. Spontaneous nystagmus still present. Fistula test negative.

January 2, 1915, radical cavity completely epidermatized. Occasional vertigo. Tested with noise apparatus shows ability to hear low whispers at eight inches (right). Spontaneous nystagmus toward both sides, more marked to the right (the diseased side). Rotation to right, nystagmus thirteen seconds; rotation to left, nystagmus twenty seconds. Caloric positive and prompt with the head in the optimum position.

DISCUSSION.

Dr. Kopetzky cited the case with parallel symptoms and outcome which he announced he would report in detail later. The patient came under observation at the Manhattan Eye, Ear and Throat Hospital suffering with otitis media purulenta chronica, and during the course of his treatment the onset of an acute exacerbation accompanied with acute labyrinthitis was noted. While under observation the onset of spontaneous nystagmus and other symptoms showing labyrinthine infection were noted and studied. The progressive increase in deafness up to total loss of hearing was seen, and finally a positive fistula test was obtained. The patient was put to bed until the acute exacerbation and the stormy clinical picture had subsided, and was then submitted to a radical mastoid operation, exactly in accord with the method indicated tonight by Dr. Friesner—i. e., no interference with the labyrinthine capsule, no curettement of the granulations at the fistula. Noteworthy in this case were that there were two distinct fistulas—one in the horizontal and one in the posterior vertical in close proximity to the ampula. The man made a perfect recovery and now has a dry ear. His labyrinthine function is, of course, lost. At this date compensation is beginning to be evident when he is tested.

Dr. Danziger asked Dr. Friesner if the nystagmus increased at the onset of the erysipelas, as Ruttin described such a nystagmus as due to a collateral edema in the labyrinth.

Dr. Friesner replied that he had not mentioned that point, which was interesting, but that there was no change in the spontaneous nystagmus.

Dr. Byrne asked if Dr. Friesner would particularly describe the nature of the nystagmus. Spontaneous nystagmus is that which manifests itself without the patient turning his eyes to an extreme degree in any direction. Extreme deviation to the right or left will develop nystagmus in the direction of the deviation in almost any person, and more especially in persons with defects in the external ocular muscles. This fact he had observed for years. He noticed, again, that in the compression symptoms in the fistula test there was nystagmus to the left as he had understood; and then under anesthesia the compression produced conjugate deviation to the right. This would argue that in the first test only very mild irritation was caused in the ampulla of the right horizontal canal, whereas under anesthesia the irritation was greater, causing a greater and more sustained effect upon the hair cells in the ampulla. This in turn caused the conjugate deviation of the eyes to the right. That seems to be the explanation of the phenomena.

It would be interesting to have another point cleared up. He had not seen these rotation tests as made by otologists. He had not much faith in rotation tests from the neurologic point of view. Other neurologists besides himself have little faith in them. Cushing and his assistants have gone to the trouble of seeing Bárány himself demonstrate his tests, and they frankly admit that, so far, the tests have proved disappointing. The physiology of the rotation tests is quite clear, but otologists always mention that nystagmus occurred after twenty seconds, etc. That is where he is inclined to take issue with Bárány, for the time element, taken by itself, is immaterial. What is material is the alteration of pressure of the labyrinthine fluid against hair cells, and it is not the time element that secures this, but, as Dr. Byrne himself has shown, the suddenness of the starts and stops in initiating or terminating a movement of rotation.

Dr. Friesner replied that he could not answer all of Dr. Byrne's questions, but that the doctor was mistaken in his original premise. In giving the history of his case he had stated that when the patient was on the operating table, and not yet anesthetized, the fistula test (compression) was performed, with the result that the nystagmus was directed to the diseased ear. The nystagmus has a slow component in one direction, followed by a rapid component in the opposite direction. We have a fairly accurate understanding of the origin of that component. We do not know definitely—although Prof. Pike states that the origin of the rapid component is in the temporal lobe, we do not know definitely the orgin of the rapid phase of nystagmus; but when a patient is unconscious—whether he has a spontaneous nystagmus or his labyrinth is artificially aroused—he has no nystagmus. In other words, what would be a nystagmus in a state of consciousness is, when he is unconscious, a slow movement, a conjugate deviation of the eyes in the direction of the slow component. The anesthesia or the unconsciousness abolishes the rapid component of the nystagmus. So in the case reported the fistula test (compression) was again made when the patient was anesthetized, and there resulted a slow conjugate deviation of the eyes toward the sound ear. It would take a great deal of time to go into the physiology of the rotation tests.

Dr. Friesner said the nystagmus is always named in accordance with the direction of the rapid component. A slow component in the direction of the sound ear would be followed by the rapid component in the other direction, when he said his nystagmus is directed to the diseased ear.

Dr. Byrne: I understood you to say that in the fistula test, before an anesthetic had been given, there was nystagmus to the left.

Dr. Dench said that at the Neurological Institute, where he had had the opportunity of examining tumors of the cerebropontine angle, they never failed to locate them by the rotation or the caloric test.

Dr. Byrne replied that we have accepted Bárány's explanations, at least in so far as they apply to neurologic diagnosis and localization, much too readily.

Dr. Friesner said that one of the important facts establishing a diagnosis of cerebellopontine tumor is the absence of caloric irritation in the labyrinth of the diseased side.

Dr. Kenefick asked if a smear or culture had been made, and if so, what was the report.

Dr. Friesner replied that there was neither pus nor cholesteatoma in the antrum or attic; simply a little softened bone in the aditus, with a few granulations.

Dr. Kenefick said that the intercurrent nystagmus preceding erysipelas, as noted by Dr. Ruttin, was a very interesting point. Recently in his own service at the Eye and Ear Infirmary, the house surgeon called up the attending surgeon and reported that his case was developing a marked nystagmus, and in the afternoon that patient developed erysipelas. The occurrence of erysipelas in almost any mastoid wound seems to have a very wholesome effect on infections of all characters. In the past fifteen years, in his own service and in Dr. Dench's large service, he had never seen a case complicating mastoiditis—which under the rules are always sent to Bellevue—in which the patient was not returned improved by his erysipelas, however much he may have been depressed by it at the time. Possibly in Dr. Friesner's case of fistula, the erysipelas infection might have exerted a helpful influence in saving the patient.

Dr. Friesner, replying to Dr. Kenefick's suggestion, said that he was very glad that the patient did not know he had had an erysipelas, for if we follow Dr. Kenefick's reasoning a trifle further, we must believe that the erysipelas cured the patient, whereas now the patient believes that the operation cured him, and he is very grateful.

Paper: A Case of Otitis Media and Mastoiditis Followed by Meningitis—Operation—Recovery. After Eight Years, Development of Cerebral Abscess—Operation—Death.*

By S. J. Kopetzky, M. D.,

New York City.

DISCUSSION.

Dr. Perkins cited a somewhat similar case, only that the patient is still alive. A secondary mastoid operation was performed on a child of six, and some four or five days later he was seized with convulsions and became comatose, so remaining for six or eight hours. It was evident that he was about to die, and a decompression operation was done, and the child recovered. The case was reported before the section, and the consensus of opinion was that the child had meningitis and that the decompression operation relieved him and he got well. About a year or a year and a half later he developed the same symptoms, became unconscious, had convulsions—mostly of the leg and arm of the opposite side from the decompression operation. Dr. Perkins said that he was away at the time, but Dr. Smith, his colleague, on Dr. Dench's staff at the New York Eye and Ear Infirmary, took charge of the case and explored the brain, and found an abscess located at some depth from the surface. As soon as the abscess was drained the symptoms cleared up and the patient got well and remains so today.

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*See page 566.

Dr. Danziger asked whether or not there was any fetor to the pus at the time of the first operation which might have indicated its origin in the brain tissue.

Dr. Kopetzky replied: Streptococcus capsulatus mucosus.

Dr. Dench asked Dr. Kopetzky where the pus came from in the second operation. He understood the doctor to say that he did not find pus in the brain. Where was it located if it did not come from the brain?

Dr. Kopetzky, replying to Dr. Dench, said that at the time of the operation he and Dr. Imperatori, his associate, had had a difference of opinion as to the origin of the pus. Dr. Imperatori thought that it came from the tympanic cavity. Dr. Kopetzky thought it came from the brain, but he could not find the point of egress. There was very little of it at the time. At the second operation there was no doubt as to its place of origin—it came from the temporosphenoidal lobe.

Dr. Dench said that a decompression operation, to be of any value, must have a very large exposure. He had little confidence in parallel incisions and decompression operations. In a decompression operation a very large incision should be made in the dura so as to allow prolapse of the brain, thus affording relief to intracranial pressure. Cushing is in the habit of excising the dura over the entire area of exposure. In the case reported by Doctor Kopetzky, the decompression would seem to have been competent, as the child lived seven years after the operation. As a general rule, however, free incision of the dura, or even excision of the dura, must be practiced in order to secure satisfactory decompression.

Dr. Sharpe said he had nothing to add to the discussion excepting that the decompression operation is used much more now than formerly, especially in cases of brain abscess and cerebral tumor, and particularly where the temporosphenoidal lobe is supposed to be the site of the tumor. As for the incision, there seems to be no doubt, from the standpoint of neurologic surgery, of the superiority of the vertical over the transverse incision. If the vertical incision is made over the squamous portion of the temporal bone, and then the temporal muscle retracted, an area of two and a half to three inches in diameter can be exposed and the entire temporosphenoidal lobe can easily be explored. The attachment of the temporal muscle to the parietal crest is not destroyed, and thus a firm closure is obtained. The reason so many herniæ are seen is that the operator using the transverse incision does not take into account this attachment of the temporal muscle, and if there be high intracranial pressure, there is sure to be a subsequent hernia. Then, too, the vertical incision permits better drainage than the transverse incision, in that the drain can be inserted at the lowermost portion of the temporosphenoidal lobe.

Dr. Dench said that he had done both operations, and while he agreed with Dr. Sharpe that in a case of brain tumor the incision which he recommends (which is Cushing's incision) is an advantage, yet where there is an abscess and we have to drain, he believed the operation by the old curvilinear incision was the better. He had done both operations, and has had better results and has had no more herniæ from the one than from the other, if the asepsis has been perfect. In the pus cases the horseshoe incision is the better. For the brain tumor there is no question that the vertical incision is the better.

Dr. Kopetzky said that in the more recent cases he had operated upon he had made an osteoplastic flap to reach the abscess and had later replaced the flap with good results. Nine years ago he was not doing that, but he now believes that this is the correct procedure. He had reported cases which had been operated upon with exactly the same technic as he had used in this case, and some of them had recovered; nor did he get more brain herniæ with the horizontal incision into the dura than with a vertical incision. Since adopting the osteoplastic flap method he had used it for abscesses in the occipital lobe and in the frontal region, and he believes this method the best means of approach. He thought that the technic of handling the hernia in a case he had reported may have had something to do with the subsequent degeneration of the brain tissue and the formation of the abscess, and he frankly confessed that he knew less about the subject eight years ago than he knows today.

Paper: Facial Contractions During Radical Mastoid Operation.*

By Chas. E. Perkins, M. D.,

New York City.

DISCUSSION.

Dr. Dench congratulated Dr. Perkins, not only upon the clinical report made, but also upon the value of his anatomic studies. There were certain clinical facts which those studies had made clear. In a case of radical operation, after the bone had been cleared from the surface of the mastoid, the anesthetist, who was an expert, reported that there was a facial twitch. The patient was a child about twelve years of age, and there may have been a persistence of the superficial branch; there must have been traction on the nerve and irritation of the facial nerve, for the anesthetist was accustomed to the operations, and noticed the facial twitching. That is the persistence of a branch of what is the normal distribution in the infant.

Speaking of facial paralyses which have occurred in the radical operation in which he had not always had a twitch, Dr. Dench said that the worst case he had ever seen was one in which he thought he had done a perfect operation, with the aid of an expert anesthetist. When he told the anesthetist that there was a facial paralysis, the anesthetist replied that it was impossible, for there had been no twitch. It could only be explained by there having been a hemorrhage into the fallopian canal.

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*See page 664.

In another case in which he was doing an ossiculectomy for chronic otitis media, the patient suddenly asked: "Doctor, what is the matter with my face?" She had an absolute facial paralysis simply after an ossiculectomy. In that instance there was probably a sudden hemorrhage into the facial canal, caused by drawing upon the chorda tympani nerve. These were three cases of unusual symptoms following operations on the middle ear.

In the first there was continuous facial twitching, beginning as soon as the skin incision was made and continuing throughout the operation when the superficial structures were touched, showing a persistence of the infantile type. In the second there was no evidence of injury during the operation; and in the third there was a facial paralysis which persisted, due to traction on the chorda tympani nerve.

Dr. Bryant: Everybody seems to agree that twitching of the face is an important sign in the radical mastoid operation. In his experience it has not been infallible. He has seen cases of facial twitching at a moment when the curette was not near the course of the facial nerve. Perhaps the twitching was due to transmitted pressure, or possibly, as Dr. Perkins says, to the traumatism of the chorda tympani nerve, or to something else, but surely not due to direct traumatism of the facial nerve. Dr. Dench, in speaking of the twitching symptom, has mentioned an interesting case of his in which the facial nerve was destroyed, but no twitching of the face was observed. The worst case of facial paralysis that he has ever seen showed no twitching of the face at the time of destruction of the facial nerve. He was watching the face, and he is positive that it did not twitch. The case was one of very extensive osteomyelitis of the temporal, occipital and parietal bones. Everything was afloat, and during spooning out the softened bone the facial nerve was torn across, and the two ends of the torn nerve were left floating in the wound. This was a case of traction, not compression, injury of the nerve.

Dr. Sharpe said that ordinarily any irritation of the nerve would cause a twitching, unless the nerve was pathologically impaired. It seems probable that in some of the mastoid cases the facial nerve is already affected and therefore it would not be easily affected by external stimuli.

Dr. Bryant replied that the facial nerve was completely severed in the case which he cited, in spite of which there had been no twitching of the face. On account of this experience, Dr. Bryant had been especially careful to avoid injury of the facial nerve by having the wound kept clear and clean. Under these circumstances it would be difficult to injure the facial nerve to any considerable extent without the knowledge of the operator, whether the face twitched or not. This case of osteomalacia had an interesting convalescence. After two and a half years there began to be some spontaneous motion of the facial muscles, which continued to improve for two years, finally leaving the face restored to almost perfect motility and tone.

Dr. Dench said that he had had one case of facial paralysis which demonstrated the difference between injury of the nerve external to the geniculate ganglion and injury of the nerve internal to the geniculate ganglion. In this case there was an epidural abscess, and the abscess lay very close to the internal auditory meatus. There was also a large superficial swelling at the tip of the mastoid. When the patient came out of the ether there was complete facial paralysis. It was a question as to whether the nerve had been cut as it emerged from the stylomastoid foramen, or whether it had been injured close to the internal auditory meatus. We know that if the facial nerve is injured external to the geniculate ganglion, regeneration either does not take place or occurs very slowly. If the injury be internal to the geniculate ganglion, the function of the nerve returns very rapidly. In this particular instance the taste test, carried out by Dr. Perkins, confirmed the hypothesis that the nerve had been injured internal to the geniculate ganglion. Full restoration of function occurred in three weeks.

Dr. Byrne said that he did not see the point made by Dr. Dench in speaking about the facial nerve. The geniculate ganglion is related to the sensory portion of the seventh as the analog of one of the posterior root ganglia on the spinal nerves. It is not related to it as the anterior horns are related to the anterior roots of the spinal nerves. There was something to be said about the rapid regeneration of the seventh nerve after injury or division. Head has done a great deal of work on nerve regeneration after injury or section. This work has not been accepted on the continent. The trouble with such work as Head's and Bárány's is that it requires years of special preparation, and after that it requires much time and abundant opportunity. The result is that few find themselves in a position to corroborate the findings. Head, in his papers on the regeneration of the peripheral nerves, states that after section of a nerve protopathic sensibility to prick returns in from eighty to one hundred days. If after a nerve injury regeneration has not taken place in this period he adds forty days, during which the surgeon must wait to see if the nerve is actually divided; if sensibility to prick does not return in one hundred and forty days, then operative procedures should be resorted to and the nerve sutured, etc. Probably every surgeon has had cases where, even after complete severance of a nerve, regeneration has taken place in a much shorter time than Head allows.

Dr. Byrne said that he is now studying that question on several cases where the nerve was sutured after complete severance; in one instance sensibility to prick returned inside of three weeks. This case had been recently presented to the Section on Neurology. In another instance the regeneration is returning almost as rapidly. These and other cases are in flat contradiction with Head's conclusions. He understood that Head's conclusions were never generally accepted on the continent. He understood that different anatomic conditions may obtain in the case of regeneration of the seventh nerve within the cranial cavity, but he did not see why regeneration of the motor portion of the seventh should have any relation to the geniculate ganglion, which has no direct trophic function for the motor fibers of the nerve. He believes that when a peripheral nerve is divided, and left in that condition for some time, there is frequently a better chance for rapid regeneration after suture of the nerve than if it were immediately sutured after division. In one of his cases alluded to the radial nerve had been severed seven years prior to suture.

Dr. Sharpe said that fewer cases of facial paralysis occurring after mastoids are reported now than formerly; this is undoubtedly due to a better operative technic.

As to those cases in which no regeneration has occurred within three years under the expectant treatment of massage, galvanism, etc., then he thought it is not wise to let the paralysis continue longer, but to try an anastomosis of the hypoglossal nerve to the distal end of the facial nerve, in order to give a chance for regeneration. The technic for that work has been so improved in the last few years that the results are much more satisfactory. He had had eleven such cases, most of them being of Bell's type of peripheral facial palsy. Of these eleven cases, six have improved—three of them so that one would not know there had been any facial paralysis, and the other three partially; the remaining five have not improved.

Dr. Dench asked what was Bell's type of palsy.

Dr. Sharpe replied that it was the term applied to those cases of facial paralysis which had a history of usually having had a cold, and then upon awakening in the morning there was facial paralysis—always of the peripheral type of palsy. Dr. Sharpe said that he would not advise operation before three years had elapsed, but that in the meantime massage, galvanism, etc., should be employed to keep the muscles in as good condition as possible. Any operation within three years would be unwise; cases of improvement after three years are rare.

Dr. Sharpe, replying to Dr. Dench, said that in some of the hypoglossal facial anastomoses there is a temporary atrophy of the homolateral side of the tongue, resulting from the cutting of the hypoglossal nerve. This atrophy rarely persisted longer than six months.

Dr. Perkins asked if the neurologists had made any tests, especially of the taste, with the view of exactly locating the lesion in cases of facial paralysis.

Dr. Sharpe replied that as a matter of routine the taste is always examined in cases of facial paralysis, and in only about twenty-five per cent of the cases is it impaired—that is, a lesion of the geniculate ganglion or chorda tympani. The examination of hearing regarding the stapedius muscle would be an interesting observation to make.

Dr. Perkins said that he is studying this question and would like to know the modern view of the question of locating the facial lesion. Of course, from the study of the nerve itself, the chorda tympani comes off very near the stylomastoid foramen, and it is easy to see how a lesion at this point would involve the chorda as well. Bell himself, and other earlier observers, when they tested the taste more than they do now, found a loss of taste sense on the anterior two-thirds of the tongue; whereas Erb, about 1870, reported twelve cases of what he called "rheumatic facial paralysis," and found that ten did not have loss of the sense of taste on that side, and that two did. Dr. Perkins said that he had been able to test only a couple of cases, one of them being a herpes zoster oticus, and that patient had a loss of taste sense on that side on the anterior two-thirds of the tongue.

Dr. Perkins asked some of the neurologists present to account for his benefit the methods of testing for paralysis of the facial nerve.

Dr. Byrne, replying to Dr. Perkins' question, said that (a) lesions of the facial upper motor neurons caused paralysis of the lower two-thirds of the face on the contralateral side, with only slight paresis of the upper third of the face; (b) lesion of the nucleus of the seventh, owing to the proximity of the latter to the sixth nucleus, almost invariably causes symptoms of sixth nerve disturbance. The facial paralysis includes the upper third of the face and is homolateral. Where the lesion is large, other nuclei and tracts are likely to be involved, especially the pyramidal tract, causing homolateral facial palsy of the peripheral type with contralateral hemiplegia; (c) lesion of the seventh at its exit from the brain axis, and in its course within the skull up to the bottom of the internal auditory canal, is usually caused by syphilitic exudation at the base or by tumors, etc., in the cerebello-pontine angle. Here the eighth and other nerves (e. g., ninth, tenth, eleventh and twelfth) are also usually implicated. The aural tests, and especially the tuning fork tests, help to locate the lesion by differentiating it from the comparatively rarer otitic labyrinthitis. In cases of basal syphilitic exudation other evidences of the disease may be found; (d) lesion between the geniculate ganglion, where the chorda tympani, after passing through the iter chorda posterius, joins the facial and a point a short distance above the stylomastoid foramen, where the chorda tympani leaves the facial, gives the characteristic disturbances of taste on the anterior two-thirds of the tongue; (e) lesion in the remaining portion of the nerve may involve the whole nerve or particular branches, but taste is not affected.

A New Electric Mouth Light.

Dr. Alfred Kahn (by invitation): The instrument herewith illustrated represents an electric mouth light, which I have found of marked utility in my practice as an ear, nose and throat specialist. Its advantages are many. I offer this reason for presenting it to you. Its essential features follow:

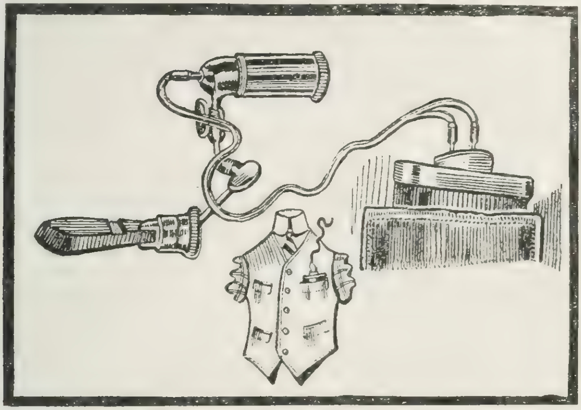

FIGURE 1.

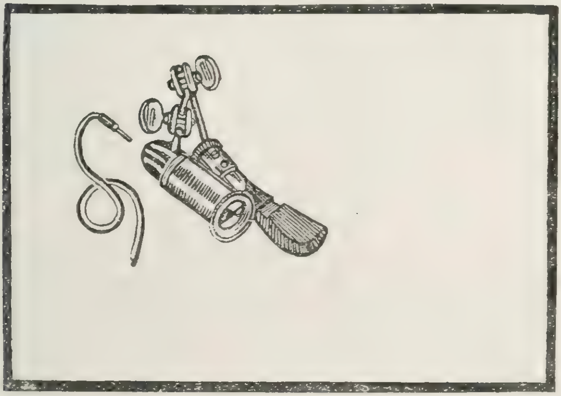

FIGURE 2.

The cuts make the mechanism and appearance of the instrument clear. The illustration shows the light as being made up of an electric flashlight mounted on a system of hinges (universal joints), the hinges connecting the light with a fiber mouthpiece, which is grooved to receive the teeth. The instrument, which is extremely light, may thus be held firmly in the mouth. The universal joints enable the light to be manipulated quickly in any direction, where it remains firmly in position. The hands are left entirely free for any operative or other procedure. The light receives its power by means of a dry battery (which can conveniently be placed in the coat or vest pocket); or if desired the instrument can be connected to the regular street current, reducing the voltage by means of a rheostat.

The light is strong and regular. The instrument can be used for any purpose for which our present headlight is used (eye, ear, nose, throat, rectal diseases, vaginal examinations, etc.).

Figure 1 shows the light connected to a dry battery; placed in the vest pocket. Figure 2 shows its compactness; in what small compass it can be folded and tucked away. The battery will burn this light about four hours continuously, long enough for most operations.

The battery and light are regular stock articles and can be secured at any electric store. This light is of special utility at the bedside or where an operative procedure is to be done in a private home. The instrument can be easily sterilized. Its cost is most reasonable.

Paper: Skiagraphs of the Mastoid in Certain Atypical Cases.*

By Harold Hays, M. D.,

New York City.

DISCUSSION.

Dr. Kopetzky said that he felt a word of caution should be uttered in regard to the value of roentgenographs in diagnosing operative acute mastoiditis. When it is borne in mind that in every case of acute purulent otitis media there is a pouring out of serum and exudate into the mastoid cells, and when it is remembered that many such cases while technically an acute mastoiditis are not so clinically nor surgically, and do not require operative interference on the mastoid process, it will be clear that an X-ray picture taken of such a case will show cloudiness of the cells as compared to the normal side, and such picture taken by itself would be misleading using it as a criterion for operative indications. If the plates show that the walls between the mastoid cells are broken down, then it is another question. The X-ray of the mastoid process is of more value negatively than as a positive finding for operation, and radiography of the mastoid must take its place with other laboratory aids to diagnosis in that it is of value when it substantiates the clinical picture.

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*See page 571.

Dr. Dixon responded that what Dr. Kopetzky had said was perfectly true. It is very rare indeed to have a normal mastoid plate in the presence of an otitis media. Almost every acute otitis media will give a hazy plate. It is the degree of cloudiness which counts. The mastoid septa do not have to be broken down in order to make a diagnosis of mastoiditis. When they are broken there is no question whatever. Unless you have a pathognomonic point on your plate, no man has any right to open a mastoid in the absence of symptoms. The clinical symptoms must be used in conjunction with the plate. It is a matter of experience in judging the degree of cloudiness which will demand a mastoid operation. If there has been an otitis media which has cleared up, and the patient still has pain, the question often comes up whether or not the patient should be operated upon. There may be no temperature, but if you find that the mastoid process has become disintegrated to any considerable degree, you have a pathognomonic point and there is then no question about it.

He cited a case under observation which in all probability will be operated upon—and if so will be reported later. This patient had had an otitis media for three or four weeks; the ear is almost dry. It was next to impossible to get any pus for examination. There was a little tenderness over the tip and antrum, and that was all. The case was skiagraphed yesterday. The plate was decidedly cloudy throughout the mastoid region.

Dr. Kopetzky said he would take no issue with Dr. Dixon, in view of the latter's large experience in radiography of the mastoid process, but he would like to have the doctor tell what kind of a picture a radiograph will show in a patient who has had an acute otitis media purulenta and an acute mastoiditis in which the intercellular walls of the mastoid process were broken down, and yet the patient has recovered from the lesion and gotten entirely well. If one reads the plate alone of such a case a few weeks after the entire recovery of the patient from the clinical standpoint, and one sees on the plate the destruction and the cloudiness as compared with the unaffected side, we would hardly call such a finding pathognomonic and indicative of operative interference, for we know the patient has entirely recovered; so again he finds that the plates alone have little positive value. He agrees with Dr. Dixon that one does not have to have broken down cell walls to have a case presenting indications for operation.

Dr. Dixon said that there is no question whatever that many mastoid cases will recover without operation. We know also that the hemorrhagic type will give as white a plate as a bone that is full of pus; it would seem that pressure has a great deal to do with it—that pressure in a purely hemorrhagic mastoiditis will give as cloudy a plate as one that is filled with pus under pressure. If a patient is improving, and there are no clinical indications for operating, it would be foolish to operate on the evidence of the plate alone, unless there be a pathognomonic point present.

Dr. Dixon said that he had approached this work with a good deal of diffidence, and did not think it of much value—indeed, he was rather forced into it, but that he was now as enthusiastic about its value as anyone in the city; and when he finds from time to time that a bone is degenerating, he believes that the patient is entitled to an operation, whether or not the canal indicates trouble in the middle ear.

The plate should be backed up by the clinical symptoms, and in reading the plate the clinical symptoms should be brought to the plate by the surgeon. All that the roentgenologist can tell is what he sees. Many of the cases, such as Dr. Kopetzky has spoken of, where there is broken down bone and the patients are apparently getting well, if followed up will be found to have sclerosed later. In the instance referred to he had taken at least nine sets of plates. They were large pneumatic mastoids, cloudy throughout in the beginning, but were not opened for lack of clinical symptoms. About two-thirds of each side gradually cleared up, and the balance sclerosed.

Dr. Kopetzky said that two years ago he made a study of secondary mastoid infections which came to the clinic after having been operated upon one or more times. The average operative finding gave a layer of rather dense compact bone, concave in outline, directly under the periosteum, of variable thickness below, inside of which there was degeneration, granulation and very often pus; and this layer of compact bone was usually found incomplete at one or other point, through which the infection very often reached beneath the skin.

He said he did not doubt that were pictures taken of such cases, either before or during the secondary infection, they would have shown a dense compact bone picture, and he therefore doubted the interpretation that Dr. Dixon put upon such plates. A definite scientific study is in order on this topic, and the plates should be taken at definite intervals during the postoperative period, running a course of a year or two; then some idea as to the processes of regeneration would be obtained.

Dr. Chambers asked what was a hemorrhagic mastoid.

Dr. Dixon replied that it was one in which the cells were filled with blood, not pus. The patient (to which he had referred) was twenty-six or twenty-seven years of age, with large pneumatic mastoids, and they were cloudy from the antrum down to the tip. No operation was done on either side, for the clinical signs did not warrant it. The case was followed from month to month, and the filling in could be observed as it developed. The outline of the old cells could still be seen, though filled with bone. He felt as satisfied about this as though he had cut into them.

Dr. Hays said that Dr. Dixon's plates of these cases had proved of material aid. It is very valuable in diagnosis to obtain a good X-ray picture. In a good many cases where the diagnosis is in doubt the X-ray will clear the situation. In three of these cases operations were done. In two there was no temperature, pain or tenderness, yet there was an acute mastoiditis which would not have gotten well without an operation. In the last case there was a slight cloudiness of the mastoid, but the clinical picture showed that the patient was getting better, so no operation was performed.

When Dr. Dixon gave his demonstration of X-rays of the mastoid before the section, he showed so many pictures that it was difficult to appreciate the essential points. Dr. Hays said he wished to show these four cases, as each one of them proved distinctly the value of this procedure in corroborating the clinical symptoms. He said that he did not think for a moment that one should be entirely guided by the X-ray, but there are frequently cases which are in doubt and where any aid to diagnosis is of a great deal of value. It is in just such cases that he believes the X-ray probably will help to interpret all the important symptoms, which means a great deal.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

Regular Meeting, Held February 16, 1915.

DR. GEORGE W. BOOT, PRESIDENT, IN THE CHAIR.

Specimen of Lymphangioma.

DR. J. R. FLETCHER showed a specimen of lymphangioma which was removed in August, 1914, from a boy, sixteen years of age. During treatment by another physician it was noted that there was a great deal of hemorrhage, and that the growths were rather solid. The conclusion was reached that the trouble was serious. Sections showed a myxofibroma. Sections made by the speaker were pronounced to be lymphangioma. The whole nose was filled with a great mass. X-ray pictures were taken, which were shown to the members. These pictures showed the antrum, nasal, postnasal and sphenomaxillary fossæ filled with the mass. When operating, Dr. Fletcher went into the antrum underneath the cheek. From there he took down the entire lateral nasal wall and took out the tumor mass from the nose. This caused terrific hemorrhage. Then he dissected toward the tumor protruding under the zygoma, and got out the smaller of two large masses. Another large mass was felt, which he loosened all around, so that it was movable with the forceps. Traction would not bring it because it proved to be attached to a large mass in the postnasal space. He then loosened the latter from its attachments, which were broad, and removed it with a No. 8 wire snare, releasing thus the mass in the sphenomaxillary fossa. Having also curetted out the antrum, he supposed he had all of the tumor out. Three weeks afterwards he found another mass occupying the sphenoid. He could go three-fourths of the way around it, as though it grew upward from the floor. With a curved knife he liberated the mass and got it out. This mass was about the size of the end of his thumb. He presumed that it had broken down the wall. On looking into the nose now, after healing, he could see that a mass protruded, and that it is a peculiar lip of bone, which is the floor of the sphenoid. It seemed to have developed between the postnasal and the sphenoid in the masses. It certainly was a rather peculiar formation of the bone. The large masses have not been sectioned, as yet, but will be done soon. It may be malignant, but that question will be settled in the near future. The speaker hoped to refer to the case at a later meeting and give the result of such examination.

Demonstration of a New Hearing Tube.

DR. ROBERT SONNENSCHEIN demonstrated a hearing tube which appeared to be very satisfactory. There are a number of such tubes on the market, of woven material over wire coils, but these are very large. There is also in this country one metal hearing tube, which is, however, much larger than the one he presented, and does not transmit sound quite so well. The speaker's attention was called to the tube he showed by a patient who has a very marked otosclerosis, in which the nerve is markedly affected. This patient is selling this tube as a means of livelihood. Without the tube he does not hear whisper at all. With it he can hear the ordinary low tone very distinctly, and the ordinary conversational tone very loudly.

The advantages of the tube are: First, it is made of oxidized copper and does not corrode. Second, both ends are detachable and can be boiled. Third, the tube is so small that it can be carried very easily. It is flexible. So far as the speaker knows, it has only one disadvantage, namely, its cost. It is an English product and somewhat expensive. The majority of tubes cost about five dollars, but this one will be ten dollars, less twenty-five per cent to physicians. If the latter is willing to forego a commission, the patient can have it for $7.50. The tube appealed to Dr. Sonnenschein because even the very slightest whisper, spoken in the midst of a noisy room, can be very easily heard by the patient above referred to when using it.

Paper: The Inferior Turbinate.*

By John A. Cavanaugh, M. D.,

Chicago.

DISCUSSION.

Dr. J. C. Beck wanted to speak from the standpoint of the pathologic changes that are found in inferior turbinates. He thought Dr. Cavanaugh had not covered the subject from that standpoint sufficiently. He had hoped that after Dr. Cavanaugh made a study of the specimens of Dr. Beck's he would save the discussion on that point. He presented forty-two histologic specimens of inferior turbinates, which represented ten different pathologic types. There are not three, as Dr. Cavanaugh stated, but ten, and they play an important part in the therapeutics, particularly as to the result of operation. First, there is the turgescent type, in which the vessels are dilated, the venous channels are distended, and not much reactive inflammation—just that inflammation which would result from congestion. Second, the later effect of that condition, namely, inflammatory, from the result of the irritation of this large turbinated body, and in this we find not only the inflammatory condition in the wound cells, but, third, increase in the epithelium, so that we have a change in the epithelial structure almost like a hornification, a folding in of the masses of epithelium. Then, fourth, you will find a changed condition in the inferior turbinated body, in the bone proper—that is, the bone is hypertrophied—an actual osteitis. Fifth, there are conditions secondary to systemic conditions, which Kyle, of Philadelphia, has especially called attention to, the cyanotic inferior turbinates, secondary to cardiac disease, in which we find a chronic edema in the inferior turbinated body. That is a true pathologic condition in the turbinate, but secondary, the same as anasarca in any other part of the body. Sixth, is the socalled "mulberry enlargement," which Dr. Cavanaugh left out entirely in his paper. These changes we are all accustomed to find in the large posterior ends of the turbinate, which hang into the postnasal space, so to speak, or against the eustachian tube. Siebenmann has shown that hypertrophy of the posterior end is really an atrophy, and has called attention to the fact that the distribution of the glands in the inferior turbinate body furnished no glands in the lower end, and to that point Dr. Cavanaugh did not call attention. Therefore, if the lower end of the inferior turbinate has no glandular tissue, the cautery in that region does not attack any physiologic structure.

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*See page 621.

The seventh form of pathologic change is atrophy, which is of various forms; for instance, as found in genuine ozena, in which the epithelium is in a metaplastic form, with shrinkage of all the other components of the turbinate, or secondary shrinkage and substitution by scar tissue, as following or associated with chronic suppurative sinus disease, or following or associated with luetic ozena. The eighth form is the primary tuberculosis of the inferior turbinate, which is characterized by chronic inflammatory changes and the pathognomonic findings of the giant cells, etc. Dr. Beck reported a case like it in *The Laryngoscope* several years ago. It is also found in Ballenger's textbook.

The ninth variety of pathologic change is the sarcoma or carcinoma, which is very well recognized from the characteristic histologic findings.

Finally, the tenth type is the miscellaneous, such as other forms of neoplasms and inflammation, as, for instance, angioma, fibroma, myxoma, chondroma, actinomycosis, rhinoscleroma, etc. All these have their characteristic histologic change. Dr. Beck has specimens of most of these conditions, and would be glad to demonstrate the sections.

Regarding cautery, this has been very interesting to Dr. Beck in the study of the results of cauterization compared with a cutting operation. Then, also, the connection of the pathologic change in the turbinate when the various treatments were applied, such as cauterization, etc. For instance, those turbinates which he found had a great deal of epithelium gave practically no result; in fact, they were made worse by cauterization. There was increase in the epithelial growth and increase in the swelling of the turbinate following linear cauterization. Whereas, in those cases in which the punctures were made the results were very good. In bony hypertrophy only the removal of some of the bone will give good results.

It is the speaker's belief that the operation described by Dr. Cavanaugh, and as recommended by Yankauer and Freer, is a case of "much ado about nothing," and not worth the trouble. He has been practicing the following: If the lower edge of the inferior turbinate and posterior end are large, they are removed by snare and the lower edge of the mucous membrane is turned up, part of the bone removed, so that the mucous membrane will cover the bone when brought down again. Where the enlargement is not so great he has been satisfied with a process he calls the crushing of the lower edge of the turbinate, not producing necrosis, but a necrobiosis. The instrument used will be described in the next number of the ANNALS OF OTOLOGY, RHINOLOGY AND LARYNGOLOGY. This procedure has positively been absolutely satisfactory in his hands, in showing the gradual reduction of the lower edge of the turbinate by this method of crushing of the turbinate. It is a slow death, so to speak, of that tissue which is not functionating. In conclusion, the speaker thought the society was indebted to Dr. Cavanaugh for his timely paper.

DR. ROBERT SONNENSCHEIN wanted to refer to two points. First, with reference to the submucous electrolysis mentioned by Dr. Cavanaugh. The speaker referred to a method that Dr. Pierce used, in which he simply made a small incision at the anterior end of the inferior turbinate, and then introduced a probe along the bone, thereby setting up an inflammatory reaction in the latter, which is the object of the electrolysis, but in this case there is no destruction of tissue, less reaction, and almost as good results as those claimed by those who practice submucous electrolysis.

Second, with regard to carbon dioxid snow, which seems to give good results for the time being, it is very easily applied, except that it is necessary to have an experienced operator. He had seen Dr. Gradle operate on one or two cases, and had examined the patients two months later, and they showed good results, but he could not say anything as to the permanent effect.

DR. H. W. LOEB, of St. Louis, was interested in the paper from two standpoints particularly, the anatomic presentation and the therapeutic. Dr. Cavanaugh mentioned some figures as to the length of the turbinate and the distance from the turbinate to other structures. The speaker would like to ask if these measurements were taken in fresh heads or preserved heads, and if taken simply with calipers or reconstructed. The error will be tremendous unless they are reconstructed, and unless one admits that the distances in the living are not at all like those found after death, because the changes that take place under the methods of preservation make a decided difference in the thickness of the mucous membrane and distances between various structures. Since the development of the submucous resection, the speaker's opinion, from his own practice, is that the inferior turbinate comes very little into play by way of treatment, whereas formerly much unnecessary operative procedure had been employed. Now he seldom finds any call for inferior turbinate work. He is inclined to agree with Dr. Beck that when one has a posterior turbinal hypertrophy, or hypertrophic condition, or cystic condition, in the posterior portion of the turbinate, there is no use doing anything except to remove it. It will never return to normal function. Most of the speaker's cases requiring operation on the posterior turbinate are those in which there has been a redundancy of the mucous membrane lying on the floor of the nose, and he simply cuts it off and pays no more attention to it. He does not adopt the refined method of Yankauer or Freer, or the somewhat angiotribe-like method of Dr. Beck.

DR. CHARLES M. ROBERTSON said that the posterior end of the turbinate is, of course, the offending member in almost all of these cases, and there are cases that come to the notice of rhinologists in which the lumen of the nose is encroached upon by the inferior turbinate, whether it be hypertrophy or vasomotor turgescence that causes it. He has been practicing rhinology long enough to have been through all of the fads, and he has bored holes under the turbinate and through the turbinate and punctured the turbinate with galvanocautery and with chromic acid, and so forth, as all the rest of the older men have. He has gone through all stages of cautery, both from above and below, and as he gets a little bit older he gets a little more conservative about the use of the knife. He has found that very many of these cases of so-called turgescence are general conditions. He has at the present time a very typical case of this character under his care, on whom he was threatening to operate. However, he prescribed a liver stimulant and got rid of some bile that was manifesting itself through the system, with reduction of the turbinate, and the resumption of normal physiologic action. He thinks we ought to keep that in mind, and not deal with these conditions surgically until we have treated the case as a physician should.

As regards the surgical treatment of the turbinate, he is agreed with Dr. Beck. When there is a hypertrophy of the bone, when there is too large a dilatation of the venous sinus, he takes off the lower edge of the inferior turbinate and sacrifices the posterior end. The speaker went through the Yankauer period, and this operation was very unsatisfactory and unnecessary in his hands. He has had cases repeatedly come back to him in which he had to ask which side he had operated upon, because the turbinate looked just as round and nice as the other.

He was astonished that Dr. Cavanaugh did not bring up that old scare about scabbing, which used to be the thing so much talked about, after taking off this large amount of tissue. We always heard a lot of scab formation on the operated area. The speaker has seen scabbing in the clinic once in a great while after an operation on the turbinates, but it was always after somebody had operated who had haggled the tissue on the edge of the turbinate and not cut it smooth. If we cut off the lower edge of the turbinate, which is devoid of venous sinus and glands, the part becomes depleted and the mucous membrane falls down and forms a V, the little pieces of mucous membrane coalesce, so that after twenty-four or forty-eight hours the mucous membranes are in apposition, and you do not have to take out any stitches or wait for them to heal. In case of the patient being a bleeder, it might be necessary to adjust the edges of the little flaps and coapt them. This can be done, if you wish, by a galvano-cautery, or it can be done by black silk sutures, or by putting a little pack in. As we get a little older, he is sure the technic will become simpler.

DR. CAVANAUGH, in closing the discussion, said he expected what he got, and a whole lot more, but appreciated what all the members said and was sorry that there was not more discussion. The pathologic side was briefly mentioned because he was not prepared to present the subject from a histologic standpoint.

In reference to Dr. Sonnenschein's remarks about the use of the probe along the periosteum, Dr. Cavanaugh has not had any experience, but did not think it would do the work in most of these cases. If there is a true hypertrophy, there would not be much contraction; and in turgescent cases, the vessels being dilated, he could not see how the operation spoken of would take care of it. Still it might.

Answering Dr. Loeb's question about measurements, those of the bony turbinates were taken in the cadavers, while the measurements with the mucous membrane were taken in the living subjects, some after shrinkage, and some before, but all the measurements mentioned in the paper were taken without shrinking.

Dr. Robertson's remarks might be timely to the younger men, but the speaker may lay claim to a few gray hairs (laughter). He has not had Dr. Robertson's experience, yet believes one could not say whether or not these turbinates were functionating by their macroscopic appearance. Dr. Robertson can tell whether these turbinates are normal only by microscopic specimens, as they show the actual changes in the turbinates, and Dr. Cavanaugh thinks that is what has to be done in all these specimens to get a foundation. It is very easy to look into a nose and see what we might call a nice turbinate, from a macroscopic appearance, but when it comes to the true functionating part of that turbinate, the speaker believes a specimen should always be removed and microscopic sections made, in order to prove the point.

Paper: Local Versus General Anesthesia in Nose and Throat Operations.

By Joseph C. Beck, M. D,.

Chicago.

DISCUSSION.

Dr. George E. Shambaugh believes that the question of an anesthesia, both local and general, is a much more important feature of operation than it is usually given credit for; especially is this true for those doing nose and throat work. First, as regards general anesthesia. It is more difficult to administer this properly for an operation about the nose or throat than for operations on the ear or elsewhere. The method usually employed of having the hospital interne give the anesthesia is open to serious objections at times; this is especially true during the period when a green interne is learning how to give an anesthesia. For this reason Dr. Shambaugh advocates strongly the employment of a trained anesthetist, especially for the removal of tonsils and adenoids, or other operations about the nose and throat. He has followed this method for several years, and would not think of going back to the old method of having to take chances with a green interne giving the anesthesia. An expert anesthetist soon learns just how deep an anesthesia to give in order to get the patient in the best condition for the operator, and does this even with children, usually without the slightest fright to the child.

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*See page 597.

At the Presbyterian Hospital they find it unnecessary to resort to any special method of giving the anesthesia. The simple drop method is employed until the child is thoroughly under. The patient is then turned over on the side, the operator sitting down in a chair. No special provision is necessary here for continuing the anesthesia, or for taking care of the bleeding, since the blood runs naturally out of the mouth and is not inhaled. If the reflexes return before the operation is completed, the cone is again replaced over the face and ether is given for a short period. As a rule, no additional anesthesia is required for a tonsil operation.

All special apparatus for administering anesthesia or for pumping blood out of the throat is adding so many more things to get out of order and to complicate the operation. The operator who has had experience gets along with very few instruments, and the same is true of a trained anesthetist. In some places the expert anesthetist seems to have had a mania for devising elaborate and unnecessary instruments for doing something which is very simply and just as efficiently done without them.

The danger of inhaling blood during the tonsil operation is when the patient is on his back. It is not without risk.

The speaker knows of two cases occurring in Chicago last year, where lung abscess developed from this cause. This danger can be entirely obviated by placing the patient on the side, as already described.

As regards local anesthesia for tonsil work, Dr. Shambaugh finds that he succeeds much better now than he did a few years ago. A great deal depends upon the technic. He never uses stronger than five per cent cocain rubbed on the surface, and injects one-half per cent novocain. Injections are made at three points only for each tonsil: the posterior pillar, at the lower pole of the tonsil, and into the capsule; the latter is accomplished by pushing the needle through the soft palate. He finds it exceptional for a patient to experience pain during this operation. He does have cases, however, where it is impossible to get complete local anesthesia. This is always the case where there have been dense cicatricial formations complicating the peritonsillar abscess, but it may also occur in the simpler cases. He has found that wherever the application of five per cent cocain and adrenalin results in a local anemia a satisfactory anesthesia is assured, and it is only in cases where the application of this solution seems to bring on a local congestion that he has experienced any trouble in getting a proper effect.

For the operations in the nose he has discarded entirely the stronger cocain solution and uses the five per cent made up in adrenalin. He has found that he gets just as complete anesthesia with five per cent as with a twenty per cent.

Dr. D. T. Vail, of Cincinnati, by invitation, said that he had nothing but words of admiration for Dr. Beck's paper. He was, however, in harmony with Dr. Shambaugh in his remarks pertaining to professional anesthetists bringing complicated anesthetic apparatuses to the operating room, taking up valuable space and detracting from the operation by constantly calling the attention of the operator and others present to the splendid demonstration as to his ability to give mixed anesthesia and have the patient come through alive. Offhand, he recalled two deaths from anesthesia in his own experience, both occurring in cases of similar nature. In each case there was a tumor involving the antrum of Highmore, which extended into the sphenoid cavity. As it was very important to have the patients properly anesthetized, he employed expert anesthetists in each case, who brought to the operating room a complicated apparatus which required as much skill in manipulating as a pipe organ. In one case the patient died three days after the operation, never having come out of the condition of shock, rapid, thready pulse, cyanotic expression, etc.; in fact, the heart whipped itself out. In the other case the patient, a little boy of twelve, was deluged with a mixture of all kinds of anesthetic gases from an elaborate apparatus, and he died on the table. Since these experiences the speaker is satisfied to use the Esmarch mask and have the ether poured on drop by drop, watching the patient go through the various stages of anesthesia to complete narcosis.

Dr. J. R. Fletcher uses both general and local anesthetics. The drop method and various devices are unsatisfactory. While we should not work against time, as formerly, both tonsils can be removed and bleeding points tied in a few minutes under continuous deep anesthesia. He has seen five deaths from anesthetics, for but one of which he must answer. This patient died after cocain-adrenalin injection, as he always does it, using about one-fifth grain to the patient. The question remains, What caused his death? The speaker has continued to use the same solution, namely, cocain, one grain; adrenalin, twenty minims; normal salt solution, eighty minims„ for years, even in small children, without bad effect. When the above injection is made in blisters around the tonsil, either with or without general anesthesia, no suction is necessary, as the amount of hemorrhage is very small.

Dr. Ira Frank said that to those doing the Killian suspension this method is far superior to any he has tried. He has not the elaborate apparatus exhibited, but still a very satisfactory one, with the foot pump. There is only one precaution he would like to mention, namely, not to pump too fast, because the patients get a direct inhalation of the ether. A few days before, he had been able to do a complete suspension, demonstrate the larynx to those present, and take out both tonsils and adenoids, and the child was still asleep.

Dr. H. Kahn wished to refer to the postoperative acidosis and acetonuria which follow carbohydrate starvation and are due to changes in the liver. The use of sodium bicarbonat is not satisfactory. The use of sugar, however, is. He has had quite a good deal of experience in postoperative acidosis, and has found that the use of four per cent glucose injected into the rectum, either before or following operation, is more effective than the use of sodium bicarbonat. The latter has practically no effect, in his opinion. It may have some, but not nearly so much as the sugar. If in those cases that seem likely to have an acidosis—ill nourished children and people who are afraid—you will feed them candy or sugar some time before operation, you will have better results. The speaker believes the acidosis is due to starvation, and, therefore, changes in the liver. If you feed them candy and fill up the liver with sugar you will have less acidosis, and the sugar is an effective agent rather than the sodium bicarbonat.

Dr. H. W. Loeb, of St. Louis, said that one phase of the subject had not been considered at any length by those taking part in the discussion. This was with reference to increasing the number of cases in which general anesthesia is administered. Dr. Beck had mentioned very casually about his growing tendency to use a general anesthetic for submucous resections, and things of that sort, referring to the fact that some men were able to do these under local without pain, by virtue of their hypnotic powers, and so forth. Dr. Beck's contention, of course, is that these patients have some neurotic result. The speaker thought that the neurotic results from using a local anesthetic come primarily from other neurotic conditions. He cannot see why anybody wishes to use a general anesthetic for a submucous resection. The speaker's patients complain of only one thing, namely, the removal of the packing after operation. To carry out Dr. Beck's idea one should give an anesthetic at that time also, unless by his hypnotic influence he can remove such packing without pain.

Another thing, namely, Dr. Beck's plan of following out the anoci association of Dr. Crile. He should carry out the other suggestions of Dr. Crile, to the end that the patients never know when they take the anesthetic. Of course, this refers more particularly to goiter operations. The patients are visited by the anesthetist day after day for a number of days; have perfumes tried on them, and a little perfume and ether, and so forth, until on the day of operation it is given without their knowing it. If we are to get the full value of anoci association, we should not only block off everything, but also the impressions which the administration of the anesthetic causes.

Dr. Robert Sonnenschein wished to suggest one thing in reference to the patient referred to by Dr. Fletcher, who died under local anesthesia for tonsillectomy, and that is, if he heard aright, that twenty minims of adrenalin were used. Freudenthal, of New York, showed in an article a few years ago that adrenalin when used in quantities more than about ten minims of a 1/1000 solution has caused death in a number of cases, where it alone was used; therefore, eliminating the fact of the cocain. He showed conclusively that a great many of these cases of sudden death during local anesthesia were typical adrenalin deaths, with very marked pallor, small thready pulse, and death in a few moments. He warned strongly against the submucous injection of large quantities of adrenalin. It seemed to the speaker that in using the Schleich method it is not necessary to use the adrenalin, because the mere injection of salt solution will give a very marked anesthesia when adrenalin is omitted.

As to the removal of the packs, if the famous Beck paste is applied on splints, such as the cotton nasal splints, on both sides at the time they are inserted, it is usually very easy to remove them on the following day.

Dr. J. R. Fletcher said, in answer to Dr. Sonnenschein, that the whole formula called for twenty minims; only fifteen minims of that were used—namely, a dose of 20/100.

Dr. Sonnenschein accepted the correction, but thought the point mentioned as brought out by Freudenthal was an interesting one.

Dr. R. H. Good said he had had two very interesting cases lately, of which he would like to speak. The first was a young boy of fourteen, in whom he did an operation on the middle turbinate. There was some hemorrhage, which, however, stopped in a minute or two. Then he proceeded to remove the tonsils, first injecting novocain around the tonsils. In a minute or two after injection the boy began to complain of terrific headache and the nose began to bleed profusely, which the speaker thought would stop in a minute, but after five minutes he was obliged to pack in order to control it. He complained of such severe frontal headache that he had to lie down, and it was impossible for the speaker to proceed with the operation for seven minutes. That was the first case of that kind he had had up to that time, but a week ago he had an adult in whom he injected novocain—a two per cent solution—and the same terrific headache appeared. He is satisfied that the novocain caused this headache.

It has always been said that we should wait for fifteen to twenty minutes for anesthesia after injecting novocain. The speaker does not find this the case. Immediately after injecting he begins to operate, and thinks the anesthesia is better.

He has been using the Brophy anesthesia outfit for at least twelve or thirteen years, and has had no trouble in keeping the patients asleep, providing the apparatus is used properly and in good repair.

Another important point about this method of anesthesia, namely, the tube that goes into the ether should have fifty or one hundred holes in the bottom of a ball-like enlarged end which is immersed in the ether, so that the air comes out of fifty or one hundred holes in small bubbles through the ether. In this way you can keep any patient asleep without a warm bath or motor. The speaker does not like the noise of a motor. Furthermore, you have a new interne every week or month, and with a warm bath and a motor the ether is escaping all the time, and you can easily put a patient to sleep too deeply with this method. The simpler the method used the better.

Another point. You could not hire the speaker to use cocain for submucous injections in tonsillectomies. He has had considerable experience with it, and would not use cocain subcutaneously for tonsils so long as we have novocain to substitute for it.

Regarding general anesthesia in adults for tonsillectomies, he gives it occasionally, when he has to, but keeps away from it whenever he can.

Dr. A. A. Hayden thought what Dr. Shambaugh said about the ischemia taking place, especially in tonsil cases, as being an index as to complete anesthesia, is very important. When the low percentage of adrenalin is used and the parts become pale, the anesthesia is always complete. When they do not become pale, it is not complete, in the speaker's opinion.

Regarding the apparatus presented by Dr. Beck, the speaker wished to recommend it strongly. A few years ago he was prejudiced against all apparatus of this sort by seeing a very noted surgeon use an apparatus of his own, and it took him an hour or two to get out the tonsils. And so he was prejudiced against such methods until Dr. Bergeron introduced an apparatus of the kind shown by Dr. Beck into St. Joseph's Hospital. He persuaded the speaker to use it, and he found that it was not a contrivance that would make the operation longer, but, on the other hand, very much shorter, if properly used. So, the apparatus exhibited is very satisfactory, in his opinion.

Another interesting point is that the operator can pretty well tell the coagulation time of the patient's blood by what is in the bottle. If clotted at the end of the operation (saying the operation took five minutes), it is a very fair estimate that the coagulation time of the patient's blood is normal. If not, it is a fair estimate that the coagulation time of the patient is not normal, and that we should look more carefully to every hemorrhage.

Dr. George W. Boot said that for the last six years they have used a much simpler method than that of Dr. Beck in the Children's Memorial Hospital. In this method they use the old-fashioned paper cone, covered with a thin towel. There is a nurse who gives anesthetics and takes X-ray pictures. Using this apparatus, she will habitually put the children to sleep with two ounces of ether for tonsillectomy, and the operation is done in this way in from ten to fifteen minutes. The ether is given until the patient is far enough asleep to take out one tonsil. The inhaler is then put back while the snare is rearranged. By the time the wire is ready for the next tonsil the patient is far enough asleep for the second enucleation. That is done and the adenoids taken out without any further anesthesia. The ether does not have time to get fixed in the tissues. They have never had a death from the anesthesia since using this method.

With regard to the use of chloroform, he thinks there is only one class of cases in which its regular use is justified, and that is in alcoholics.

He would like to speak of another point, namely, doing mastoid operations under local anesthesia. He has done four such operations under local anesthesia. Two of these were in children sick with scarlet fever. One was in a man who was far advanced in tuberculosis, and had chronic Bright's disease. The fourth was in a man who did not want to take ether. In all four the operation was done very well under local anesthesia, using novocain.

Dr. Beck, in closing, said that he knew very few would agree with him, and he sincerely hopes that by the time the subject was presented again by someone else a good many would have changed their minds, because he honestly believes that if it were left to the patient whether he wanted to be operated under local or general anesthesia (if he had been operated before under ether), he would prefer being operated under general anesthesia.

In regard to the drop method of anesthesia, Dr. Fletcher answered that point—the patient is not asleep long enough. You cannot do good work unless you are a rapid operator, when you use the drop method of anesthesia.

Regarding deaths from anesthesia, the speaker recalled four, all when ether was employed. One of these occurred in Dr. Gradle's practice. The speaker operated on a brain abscess, and the patient died on the table. He was very low before and during the operation, and there is a question whether he died from the anesthesia or from the brain abscess.

The second case was one he had reported to this society four years ago, which occurred in a colored man who was operated on for meningitis. In this case it was discovered postmortem that the man had only one kidney, which was cystic, and the other was an infantile kidney. He had uremia, and so the anesthetic perhaps helped him along a little sooner.

In the third case the patient was operated for tonsils and adenoids, and the child died on the table while the assistants were operating. Dr. Le Count made a postmortem examination, and an enormous thymus was found, a status thymicus. In trying to find the vessel for injecting adrenalin as a restorative measure, they could not find a large enough artery or vein to do so.

The fourth case was one which occurred in a case operated on out of town, and in this case he felt sure an overdose was responsible, namely, no attention was paid to the amount given, and the patient was simply drowned in the ether.

Dr. Fletcher had called attention to a death from a local anesthetic, and the speaker said he was looking at Dr. Loeb, to remind him that deaths had been reported before from local anesthesia. How about the cases that he (Loeb) operates under general anesthesia? Perhaps he meant to say he would not use general anesthesia unless he had to. That is only discussing a little point in a big question. Dr. Beck would say that the general anesthetic must be made as safe as possible, and a good anesthetist employed, upon whom you can rely, and then you need not fear death from ether anesthesia. So, after all, it is not the question of finding objections to the general anesthetic, but the manner in which the anesthetic is administered.

Dr. Kahn spoke of glucose instead of bicarbonat of soda. Dr. Beck only knows that since using the bicarbonat of soda, whether scientifically proven or not, it has seemed of value. He could only take Dr. Lynch's word for it, from his experience. Dr. Lynch lost his own child from acetonuria following an operation, and went into the subject carefully, having made experiments, and he thinks that bicarbonat of soda is of value to prevent the acetonemia. It is used in diabetic cases where general anesthesia is employed. The glucose may be better. The speaker would like to think it over.

In answer to those who spoke of the apparatus exhibited as elaborate, he would state that a great deal of comfort is attained by operating with the patient asleep, with no blood in the throat and mouth, not covered with a mask, which is worth all the elaborateness of the apparatus.

In regard to the removal of packing being painful, he would quote Dr. E. Fletcher Ingals in giving an anesthetic to remove nasal packing. He had reported that to this society some two years ago. The speaker, however, has never done this.

Regarding anoci association, the speaker uses it, but not with perfume. There is no speaking allowed in the room while the patient is being anesthetized.

Regarding the motor in the apparatus exhibited, and the noise it makes, Dr. Good's objection to it is perfectly correct. The speaker thought also that the foot bellows would be better, but the foot pump is constantly getting out of order, and so he had done away with it. He thinks the method of giving the anesthetic with this apparatus is simpler and easier than with a foot-pump, and so he uses the motor attachment.

Dr. Sonnenschein spoke of death from the use of adrenalin. The speaker two years ago reported on the use of adrenalin in otosclerosis. He has used it since then, as high as fifteen minims every other day, and has seen nothing but the symptoms that result from adrenalin. Those of the members who knew Hansen's experiments on adrenalin would know that fifteen minims are not toxic. He did not think that death in Dr. Fletcher's case was due to the adrenalin.

Futterhoff, of Philadelphia, has reported one death from sudden shock due to distention at the mucocutaneous junction, in connection with the submucous operation. Dr. Stubbs reported on this very fact at one of the meetings of the society several years ago.

Regarding the point brought up by Dr. Hayden as to blood clotting, the coagulation time is determined as nearly as possible before operation.

Regarding chloroform, the speaker had said in his paper that he would use it in infants. There is quite a call for it in such cases, but not in older children or adults.

In conclusion, he would like to recall the statistics given by Rovsing three years ago to the American Medical Association, in which he stated that fifty thousand ether anesthesias were collected without a death; twenty-seven thousand chloroform, nitrous oxid and other forms of anesthesia with sixteen deaths.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

Regular Meeting, Held March 16, 1915.

DR. GEORGE W. BOOT, PRESIDENT, IN THE CHAIR.

Anomalous Condition of Middle Ear, With Pulsation of Lower Half of Membrana Tympani and Distal End of the Floor of the Auditory Canal.

DR. OTTO J. STEIN saw this patient for the first time in November, 1914, about four months ago. At that time he gave a history of having been deaf in the left ear, the right ear being normal. At no time has there been a history of any discharge or pain. The only thing noticed was that the loss of hearing began rather gradually, accompanied by tinnitus and some vertigo. When first seen the drum was a little red, probably from manipulation incident to treatment. He had been under the care of some others prior to coming to the speaker. This redness gave the impression of an inflammation, but as that subsided one could see that the drum was very flaccid and thin, and apparently otherwise normal. There was no evidence of a scar. It lay well forward toward the floor and anterior wall of the canal, giving the impression as of something pushing it from behind outward and forward. When the otoscope was inserted firmly and compression made, this flaccid drum was driven back to its more normal position, and as the air reentered, allowing the drum to sink outward and forward, you could see the pulsation synchronous with the carotid. There was no hearing whatsoever in that ear, neither bone nor air conduction. Since being under observation he has a little bone conduction. His static apparatus is all right. He had a very faint rotary nystagmus on looking straight forward when twelve milliamperes of current were used. Otherwise negative. Responded to all tests.

Dr. Stein presented the case as a rather curious anatomic anomaly. He did not know the exact pathology. On compression of the carotid in the neck with the finger the patient said the tinnitus was markedly diminished. If pressed long and hard enough, it would disappear altogether.

The patient has remained in about the same condition as when first seen, four months ago, and at that time he had had the trouble for six months.

DISCUSSION.

DR. OTIS H. MACLAY asked if the blood pressure is very high.

DR. STEIN said he did not know the blood pressure. He had some X-ray plates which are interesting, which he showed to the members.

DR. SHAMBAUGH asked if there was no discharge at any time. Also if there was perforation.

DR. STEIN replied that there was no discharge at any time. Also, there was no perforation, except that done traumatically. From examination of the X-ray pictures, it looked to him like a diverticulum off the sigmoid portion of the sinus; like an appendix coming off toward the floor of the canal.

Unusual Case of Vertical Nystagmus Caused by Labyrinthine Irritation.

DR. ALFRED LEWY exhibited this case. The man is forty-two years of age; married; gives a history of discharge from the ear in childhood, which has not troubled him since he was about ten years of age, but for the last year has been complaining of mild vertigo, coming on suddenly; particularly on sudden movements of the head or turning the eyes suddenly to either extreme. The patient admitted having syphilis about twenty years ago.

On examination the speaker found a large anterior marginal perforation in the left drum membrane, and both ears gave the usual findings of a marked conduction deafness, more marked in the ear with the perforated membrane. After rotation, nystagmus is thirty seconds to either side. On account of the perforation the speaker did not try the caloric test, and did not have any electric apparatus handy for the electric tests. He did find, however, that on compression of air in the left canal he had a marked vertical nystagmus, two or three jerks downward, and Dr. Lewy believed this to be a very rare condition; in fact, some claim that there is no such thing as a vertical nystagmus from the labyrinth. It is very evident that this nystagmus is caused by labyrinthine irritation. The doctor, however, was not prepared to give any explanation for it. He hoped some of the members could offer an explanation of such a condition in the presence of a perforated drum membrane.

DISCUSSION.

Dr. George E. Shambaugh asked if he could get the reverse nysgtamus by suction.

Dr. Lewy replied that the suction reaction was doubtful.

Dr. J. R. Fletcher believed there was a fistula present in the case, but unless the eyes move in opposite directions by compression in one and suction in the other, it is not demonstrated. At least, that was the law laid down by Bárány, and seemed to the speaker to be correct. You can have the reasonable probability with movement in one direction, but no proof.

The speaker has produced a nystagmus by direct pressure, which would move the stapes inward, and that might be the case in the patient presented. He remembered indistinctly a case he saw a good many years ago of vertical nystagmus, and his impression was very strong that this man had a fistula in the oval window, and a vertical nystagmus was produced by pressure. There was no nystagmus by suction. It was tried then to see whether the same thing could be produced on a perfectly normal individual, and one of the doctors present volunteered for that purpose, and with strong pressure a nystagmus in one direction could be produced.

Dr. George E. Shambaugh said that he was not inclined to exclude the existence of a fistula where one is able to produce a nystagmus in one direction by pressure, but fails to get the reverse nystagmus by suction. One can easily imagine the development of pathologic conditions about the opening of the fistula which would permit a motion of the endolymph being caused either by suction or pressure, but not by both. One also gets a fistula symptom in cases where no fistula exists. He has been able to develop this symptom by the inflation of the middle ear in cases where there had never been a suppurative disease. The nystagmus which occurs in fistula cases is in the plane of the canal which is involved. For this reason it is not easy to figure out how a vertical nystagmus can be caused. The horizontal and the superior canals are the two which encroach upon the middle ear spaces, and in which fistula can develop from suppurative otitis media. Possibly a fistula into the vestibule, associated with inflammatory deposits in the labyrinth, might result in producing endolymph currents by pressure which could so affect two of the canals as to produce vertical nystagmus.

Dr. Lewy, in closing the discussion, did not see why we must assume that the nystagmus is necessarily the result of a lesion in one of the canals. It is possible that the general compression of the endolymph through the pressure produced on the round window and oval window through the external canal may in some way affect the end organ in the saccule or utricle, and in that way cause a nystagmus; but as to whether a fistula was the cause of the nystagmus, the speaker could not say. His principal reason for presenting the case was that it was only recently that he read a statement in a laryngologic journal that there was no such thing as vertical nystagmus resulting from a lesion of the labyrinth, and it is very evident in the case presented that this nystagmus is induced by irritation of the labyrinth.

Exhibition of Three Patients Operated on by the "Standard Tonsillectomy", to be Described Later in Dr. Fletcher's Paper.

Dr. J. R. Fletcher said that he had shown these patients to quite a number of the gentlemen present. His purpose in bringing them was to show that one can get by dissection, called the "standard tonsillectomy," uniform results, which seem to the speaker to be desirable—namely, rudimentary tonsillar fossa and a minimum scar. The first case was operated on four years ago, the second case one and one-half years ago, and the third one just one week ago. The results in the two which had healed are almost identical, and he knows from former experience that the same result will obtain in the third case. As the paper would show, the speaker believes there is a reason for such uniform results.

Specimen of Right Frontal Sinus Which Extended Downward, Seeming to Separate the Crista, and Extending Into the Perpendicular Plate of the Ethmoid—Exhibition of X-Ray Picture of Case.

Dr. L. W. Dean, Iowa City, Iowa, said this specimen had been discovered in working out a series of anomalous frontal sinuses. In this specimen the right frontal sinus extended downward, seemed to separate the crista, and extended into the perpendicular plate of the ethmoid. The X-ray showed this sinus descending into the bone of the septum.

DISCUSSION.

Dr. George E. Shambaugh stated that he had in his collection a specimen somewhat similar to the one shown by Dr. Dean. In his specimen the frontal sinus on one side had a prolongation down into the nasal bone, but no opening into the nose. There was a large defect in the septum separating the sinuses, and the drainage was through the opposite frontal sinus. It is not easy to see how a sinus of this sort develops. The frontal sinus is an outgrowth from the middle meatus. It seems probable that the opening in the nose had become closed by pathologic conditions, and the artificial opening had been made through the septum into the opposite sinus.

Paper: Cases of Lateral Sinus Thrombosis.*

By George W. Boot, M. D.,

Chicago.

DISCUSSION.

Dr. Robert Sonnenschein said, apropos of the difficulty of recognizing the presence of sinus thrombosis, he wanted to briefly report a case in which Dr. Boot had kindly assisted him. The man was about thirty years of age, and was admitted to the County Hospital the Thursday of the previous week with a history of discharge from the ear for the past month. There was no history of chill or high temperature. Temperature on admission was 99°. There was some tenderness over the mastoid, and profuse, thick, purulent discharge from the ear. The next day (Friday) a simple mastoid was done—the antrum found rather high, and apparently all necrotic bone removed. The patient, however, did not recover consciousness. Temperature on the day of operation was 101°, and on Saturday, the day following operation, it went up to 103° at noon. He was reoperated and the sinus uncovered, it being necessary to go through solid, apparently healthy bone to reach the sinus. It was found filled with pus and a clot. The patient was moribund when placed on the table, and died shortly after the sinus was exposed. In this case there was absolutely no history of chill and high temperature until an hour or two before the last operation. The leucocyte count on the day of operation was twenty-five thousand.

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*See page 554.

Dr. Boot said that he had hoped the members would discuss the diagnosis and treatment of sinus thrombosis, especially with reference to the point of whether to ligate the jugular or not.

Dr. George E. Shambaugh said he thought sinus thrombosis is the most frequent serious complication that occurs in acute suppurative otitis media. The typical symptoms when the sinus is the seat of absorption are so characteristic that they can scarcely be mistaken. The high temperature, the sudden drop to subnormal, a sudden chill, and a recurrence of the same fluctuation in temperature. Not all the cases presenting these classical symptoms require the same treatment. These symptoms occur apparently from an involvement of the veins leading from the mastoid to the sinus, and where there is no actual thrombosis of the sinus itself. Dr. Shambaugh has several times operated and exposed the sinus in the presence of the characteristic fluctuations in temperature only to find no evidences of a thrombosis, with a droplet of pus apparently in contact with the sinus wall. Such cases usually recover promptly simply on removal of the condition in the mastoid.

The question of what should be done when the sinus is found to be thrombosed must be decided differently in different cases. Where there is no evidence of a softening of the thrombus, a free opening of the sinus, with perhaps a partial removal of the thrombus, is very often better than an attempt to get bleeding from both ends. In cases where there is a suppurating thrombus, an effort should be made to remove as much as possible of the infected thrombus. Before this is undertaken the internal jugular should first be ligated.

Dr. Norval H. Pierce said a practical point was raised by Dr. Boot's paper, namely, the question of waiting. There are certain operators who, given a chill and a sudden rise in temperature, accompanied by a high leucocyte count and a running ear, will immediately operate on a sinus, open the sinus, and ligate the jugular. After a long experience he has come to the conclusion that that is a mistake. He does not think we should rush suddenly into any of these cases. He does not think that the patient's life is particularly endangered by waiting, by introducing the element of very careful observation before we go into these cases. He has had several experiences such as those cited by Dr. Boot, where, in the course of an otitis media—suppurative—the patient has had a chill and high elevation of temperature, accompanied by a high leucocyte count. In the course of a few hours or the next day an erysipelas developed, and there are other things that may happen in the body that will give this same picture, such as pneumonia, malaria, etc.

Now, if the infection is so virulent in a lateral sinus that it is going to carry the patient off in a few days, the operation is hardly going to help the patient—not even ligating the jugular and scraping out the clot. It will in all probability spread up the petrosal sinuses or back toward the posterior portion of the skull from the lateral sinus, or become distributed throughout the body. From a practical standpoint, therefore, he thought we should be impressed with the fact that we should observe a period of careful investigation after the onset of the initial symptoms of sinus thrombosis before operating. The length of time that period should occupy depends on the individual case. But once the diagnosis is made of a sinus thrombosis, his experience has taught him that we can scarcely be too radical. He has tried the method of slitting up the sinus and allowing the thrombus to remain in situ, simply packing it open, but has been rather disappointed in this method. He believes an endeavor should be made to get a hemorrhage from both ends of the wound, and failing hemorrhage from the lower portion, we should not only ligate the jugular, but we should dissect it out from above the facial to as near as possible to the clavicle.

Another practical point is the relationship of leucocytosis. He did not wish to contradict himself by saying that he places great reliance in a high leucocyte count. He has scarcely ever been disappointed in accounting for a high leucocyte count by the finding of, if not an actual thrombosis of the sinus, at least a suppurating focus in contact with the osseous or membranous portion of the sinus somewhere in its course. Therefore, he would say that a leucocyte count should be taken in all cases of mastoid trouble, where operation is performed; and if a very high leucocyte count is found, we should be very careful to explore very much more thoroughly than we would if we did not find such a high leucocyte count before operation.

Dr. Kahn asked Dr. Pierce what he thought about blood cultures.

Dr. Pierce replied that he did not believe they amounted to very much as a pathognomonic sign of sinus thrombosis. The work of Duel and others in New York is so contradictory that he does not believe much dependence can be placed on the findings of bacteria in the blood as a sign of sinus thrombosis. In his own work, which has been very limited in that regard, because after reading the work above referred to he came to the conclusion that it was not dependable, he has found bacteria in the blood where there could not possibly have been any sinus thrombosis whatever. Therefore, he would say that the bacteremia is not an indication of sinus thrombosis.

Dr. S. A. Friedberg fully agreed with Dr. Pierce in regard to conservatism in these cases. However, he thinks there are times when we can be too conservative. He thinks too much reliance has been placed on blood findings, waiting for the high leucocytosis. A low leucocyte count does not exclude sinus infection by any means. Neither does a negative blood culture. His experience with blood cultures has been about fifty per cent positive. We know, too, that we may get a positive blood count from other infections—from a streptococcic sore throat, for instance. A certain work carried out at the Durand Hospital for Infectious Diseases found that in almost all the case examined—he could not recall the exact number—cultures were made aerobically and anaerobically, and organisms were found in at least ninety per cent of the cases where quite careful culture work was done in conditions other than sinus infections. He recalled two cases seen recently of sinus thrombosis in which the infection extended to the meninges—cases in which there was no definite picture of sinus involvement, although suspicion of it was present at the time. In one of these cases there were chilly sensations—not regularly—perhaps not more than one in a week, a relatively low temperature, a leucopenia instead of leucocytosis, and a negative blood culture. The speaker wished to bring out one point in connection with suspected sinus infection: The mere fact that a sinus appears normal does not necessarily mean that there is nothing in the sinus. During the last few months he has seen two cases where a practically normal appearing sinus contained pus.

There is another class of cases we see in which the symptomatology of sinus thrombosis is simulated, and that is in severe types of scarlet fever. He has seen a number of these cases complicated with ear conditions, in which a mastoid operation was necessary. Good drainage was secured, but still the irregular type of fever and chills occurred, which warranted one in opening the sinus. In two of these cases he recalled definitely he was unable to find anything in the sinus. There was free bleeding above and below. There was the whole picture of sinus thrombosis, complicated with metastases in the lung and spleen, also joint involvement, and practically nothing in the sinus. This shows that it is not always easy to make the diagnosis in these cases, even in the presence of a typical sinus picture. It must be borne in mind that sinus thrombosis in any other part of the body of a large vein will give the same picture. He believes that if we wait too long, however, in these cases of suspected sinus thrombosis we are defeating our own ends. Personally, he does not care about going into the sinus unless he feels the indication is clear, but he feels that he has been a little bit too conservative in that respect.

Dr. L. W. Dean, Iowa City, said that eleven years ago, following a mastoidectomy, a patient developed a septic temperature with chills. Temperature was as high as 105½°. Sinus phlebitis was diagnosed and the sinus operated. It was found to be normal. The day following the operation on the sinus erysipelas developed. Fortunately there was no serious result. Since that time in his service the rule has been never to operate upon a sinus until erysipelas has been excluded. In many cases operation has been prevented by close adherence to this rule.

Dr. Robert H. Good said that in one of his cases there was never a discharge from the ear. On Christmas the patient had a cold and complained that she thought there was some disturbance with the ear, but that was all the complaint made. Three weeks later she went to the Chicago Polyclinic, and there was a swelling back of the ear at that time. The drum membrane and hearing were perfectly normal. She was treated for six weeks, at the end of which time she consulted the speaker, and he found a large swelling back of the ear. Hearing normal. Drum membrane normal. He decided to operate. As soon as he opened the mastoid there was pus escaping, which was pulsating, coming from the extradural space. There was a very extensive sinus thrombosis, so that he had to ligate the internal jugular. The point he wished to make was that there never was any discharge in this case. The pus discharged into the extradural space.

Dr. John A. Cavanaugh reported an interesting case of a simple mastoid, upon which he operated three weeks ago. For two days the patient's temperature was normal. The third day the interne phoned that the patient had gotten out of bed to go to the toilet and had fainted. When the doctor reached the hospital the patient's temperature was 102° and there was retention of urine, also a slight sensation of chilliness. He complained of the right side of his chest, which, on examination, showed a slight area of pneumonia. The following day the temperature shot up to 103.8°. Dr. Cavanaugh had one of his colleagues see the patient with him, and he said he thought the patient had a sinus thrombosis. A culture was made that revealed a pure pneumococcic infection, both in the discharge from the ear and from the mastoid process. A blood culture was made, which was negative. Leucocytosis was present. The fifth day the temperature was 100°. For three days the temperature ranged from 99° to 100°. Then it mounted to 103.8°. The same colleague again saw the patient with Dr. Cavanaugh, and then believed it to be an epidural abscess, but there were no findings to indicate such a condition, and Dr. Cavanaugh still thought it advisable to wait for more positive symptoms to help in the diagnosis. Gradually the lung condition subsided and the temperature—for the last four days—has been normal. This case was reported to cooperate with the conservative views expressed by Dr. Pierce.

Dr. Boot, in closing the discussion, said, with regard to the cases where there was suspected sinus involvement, there seemed no reason why the sinus should not be exposed and examined. Exposure of the sinus does no particular harm in the course of the mastoid operation, but it seemed to him to be decidedly not the thing to do to expose a sinus which we believe is thrombosed and contains pus, and do nothing more than expose it. It certainly is not surgical to leave an abscess without opening it, if we think there is pus in it, and it is not good surgery to leave a sinus which contains pus without opening it.

He was thankful to Dr. Pierce for not criticising him more severely about the erysipelas case, because he talked this case over with Dr. Pierce before opening it. If he had taken his advice he probably would not have opened the sinus.

As to the question of waiting, he recalled a patient on whose mastoid he operated without exposing the sinus. The septic condition gradually increased and finally ended in death from pyemia. Postmortem disclosed abscesses in the spleen, lungs, walls of the intestines, and also in other places. This was a case where he believed, had the mastoid operation been done earlier, the general infection would not have occurred. There was no thrombus found in the lateral sinus at postmortem. Nevertheless, the speaker believed the metastases took place from the mastoid, and had the mastoid operation been done earlier the child might still be living.

The question of blood cultures is probably, as Dr. Friedberg said, not of any great value in more than half the cases.

The case referred to by Dr. Sonnenschein had been seen by Dr. Boot. The man had absolutely no symptoms on which a diagnosis of lateral sinus thrombosis could be made. He was simply profoundly toxic, and during the second operation Dr. Sonnenschein exposed the sinus and found it filled with pus.

The case reported in the paper, where the jugular vein was opened and found to be full of pus, was a case that should have been ligated earlier. In this case it was not ligated because the clot was found at the lower part of the incision. The vein was opened just above the clot, pus evacuated, and, fortunately, the patient recovered.

Paper: The Differential Diagnosis of Laryngeal Motor Paralysis.*

By Otto J. Stein, M. D.,

Chicago.

DISCUSSION.

Dr. Otis H. Maclay said he had been very much interested in the paper. He had a case some time ago in which the thyroid was enlarged, and which was about to be operated upon. In this case the enlarged thyroid was on the left side, with a hoarseness which had persisted for about three or four weeks. The findings showed a complete paralysis of the right side, which was the opposite side to the enlarged thyroid, with an overadduction of the left cord in its effort to overcome the lack of adduction of the right side. Here was a cross pressure paralysis that was very decided. Operation was performed, and in about two weeks there was practically normal speech. The operation was performed for the removal of the goiter on the left side. The voice cleared up, as above stated, in a very short time.

Dr. Charles H. Long had been very much interested in the paper. He reported the case of a man, apparently in good health, fifty years of age, with abductor paralysis of three months' standing, coming on very suddenly, with no apparent cause. The patient denied lues. A Wassermann test was twenty-five per cent positive. Intravenous injection of salvarsan three weeks ago. The aphonia is the same. He is taking sixty grains of potassium iodid daily.

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*See page 669.

Dr. Stein, in closing the discussion, in reference to Dr. Maclay's case, said that if the cords had not been examined, as in his case, and the voice returned, one must not be misled in believing that the paralysis had been restored, because frequently the voice will return, of course, from a compensation of the opposite cord. That is a well known condition, which happens frequently after operations for goiter, where even the nerve is injured, and the paralysis, due simply to an injury or pulling or edema around the nerve, finally dispelling. Even if the cord does not return to its perfect function, the opposite cord eventually meets the paralyzed cord, and the patient has a very satisfactory voice. In Dr. Maclay's case the speaker could conceive of such a paralysis being due to a transmitted pressure, such as we have in some aneurisms. Removing the goiter in this case relieved the pressure from the opposite side.

As to Dr. Long's case, the speaker would like to inquire as to whether an X-ray picture was taken.

Dr. Long replied in the negative.

Dr. Stein looks upon many of these cases with a great deal of suspicion of aneurism. He finds that we can diagnose aneurism more often than any other class of medical men. Laryngologists should examine the larynx in all patients, as a routine measure. These patients come in for various symptoms—sometimes simply for diagnosis, sometimes for hoarseness—and the medical man has not made a diagnosis. In fact, internists admit that it is very difficult for them to make early diagnoses of aneurism of the arch. The laryngologists may make it before the internists, and the X-ray first of all. It shows very prettily in X-ray pictures, and in many of these cases you can confirm a diagnosis with such a picture.

Paper: A Discussion of the Standard Tonsillectomy.*

By J. R. Fletcher, M. D.,

Chicago.

DISCUSSION.

Dr. Norval H. Pierce said that his technic in tonsillectomy does not differ especially from that described by the author of the paper. He does not believe in any operation other than dissection. He thinks it is a surgical procedure, not depending on personal dexterity or trickery. It can be done by anyone who is at all used to operating in this region. As to time, we should take as much time as necessary. Safety first. He thinks there is less hemorrhage from careful dissection than from the other methods—from the one instrument methods. But after examining some of his patients a year or two after operation, he has been, frankly speaking, impressed with the fact that the resultant conditions were not altogether satisfactory. He has sent his patients away with a sense of entire satisfaction. At the time of operation he has examined the tonsil and has accounted for every particle of it. And then, a year or two after that, these patients come back with a large piece of tonsil occupying one or both fauces. He supposes this is occasionally due to the pulling up of lymphoid tissue into the scar from the base of the tongue. That was the only way in which he could account for it. At one time he thought it unnecessary to take away the lower pole completely. He has found that that is a mistake. The lower pole gives trouble. The tonsil should be removed completely. Up to the present time he is not sure whether he knows just how to prevent the drawing up of that lymphoid tissue into the scar after a while. He could exhibit a number of cases showing just as good results as in the patients of Dr. Fletcher. But he does not know what causes the failure to secure ideal results in a certain percentage of other cases. He wished Dr. Fletcher would tell him whether he really believes there is something that prevents in all cases this dragging up of lymphoid tissue in the scar. Incidentally, he would add that he has had occasion to examine patients operated on by specialists of the first class, and he has observed the same unsatisfactory conditions which he has occasionally observed in his own cases.

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*See page 591.

Dr. G. S. Mikkelson asked Dr. Fletcher how he got a linear scar with a circular incision without using sutures.

Dr. A. M. Corwin had been very much interested, in an anticipatory way, regarding what the standard operation was for tonsillectomy, because he does not know it. The standard operation for attack upon a tonsil that needs attacking for local lesion or for regional or systemic reasons is plain. That standard operation is tonsillectomy—tonsillectomy with the capsule, in spite of the fact that there are a few adherents even of removal of the tonsil just inside the capsule. He admires the skill of the gentlemen who can do that. Whether that operation will ever become standard is more than doubtful.

A standard is not established in a day, or in a decade; furthermore, it is a movable quantity. What is standard today is on the shelf tomorrow. This is the case not only in laryngology, but in general surgery and in medicine. There are clear indications, we will say, for removal of the tonsils, and yet there are fifty-seven varieties of instrumentation and technic for their removal, and each of these varieties is delivering the goods, whether in a minute or in a half hour. They are fulfilling the indications that were laid down by the speaker.

Dr. Fletcher's cases show very good results. Dr. Pierce had well said that just such results are seen every day. We are all getting those results by the methods that we choose to follow. Who shall say that the use of the scissors, in one or more of its different forms, is not to be standard in a decade or two? The speaker did not know. He knows gentlemen in this city who do very skillful work with the scissors, work certainly not to be improved upon. One of the most skillful operators in this country he has seen use a knife, a pair of forceps and a snare, and he takes out both tonsils, one after another, in ten consecutive cases, taking a fraction of a minute for each case, taking the adenoids out, too, in the same time, and doing it with as great precision as any of us. The speaker did not care whether a man uses a straight knife or an angular knife, or whether he uses three or four knives or instruments in doing a tonsillectomy, or whether the technic of the individual operator runs to simplicity, the point is the same—deliver the goods.

Of course, the members knew very well that he is an ardent advocate of the Sluder method. There are many little technical points about the Sluder operation, and if you see a dozen Sluder men work you will find a dozen little different methods of technic, but the principles applied are all the same. And when one looks at the Sluder operation, and says that it is bunglesome, that it is merely a one instrument makeshift for good work, a mechanical uncertainty, and that its manipulator works in the dark and takes off two or three layers of this, that or the other thing, one is not really discussing with intelligence, as the facts do not bear out such crude criticism, chiefly from those who have never tried it.

Time only will tell what the standard operation is. Dr. Corwin did not think Dr. Fletcher had made good in telling the society what the standard method of tonsillectomy is, because certainly the technic laid down in the paper is not standard, for it is not used by a majority of men in the country, men who claim to be skillful along this line. In order to make an operation "standard," the majority of men must adopt it. In the meantime, we will do the very best work we can with the different technics and different instruments.

Another point, with regard to hemorrhage. That is a matter that is greatly exaggerated, in Dr. Corwin's opinion. In a large number of tonsil operations, in both adults and children, he has never had to ligate an artery yet. He has never had to sew the pillars together or resort to any of those things that we lay down in textbooks as things to be resorted to. If you have bleeding in this region and will apply pressure with stypsis for a few moments, you will always control those cases, except in hemophiliacs. The speaker always operates in a hospital, unless proper facilities are available in the private home, and general anesthesia is employed. With properly applied stypsis he has a practically bloodless pharynx. The Corwin tonsil hemostats are invaluable when used in pairs in adult cases.

Dr. Fletcher, in closing the discussion, said that the standard that we recognize is a tonsillectomy. He also stated that we have not agreed upon a technic, and so he presented a technic for consideration. He did not mean to suggest for a moment that he could operate any better than a great many men, but being opposed to the Sluder method, it being a step backward, in his opinion, he so expressed himself. Being a one instrument affair, it seemed more clumsy to him. He did not mean to say that some operators by the Sluder method cannot acquire a great deal of skill, but he does not think the bulk of operators can. He has seen on the vaudeville stage a woman who wrote a very good hand, or foot, with her toes, so that when we practice enough we can apply skill in a great many unusual ways. But one can acquire the skill to take out tonsils as they should be taken out with dissection. He had stated in the paper that he did not insist on his technic being followed, but offered it for discussion as opposed to the Sluder. He is not opposed to the gentlemen who follow Sluder, because he thinks they are just as earnest as others, but he thinks there is a more uniform way of taking out tonsils than can ever be acquired by any large number of men using the Sluder method. The latter traumatizes a great deal more and does not uniformly give as good a scar as dissection. One who can use the knife alone is to be congratulated. He, personally, cannot do it. All who use the Sluder method agree that it must be learned, and that there are certain cases in which it is not to be applied. Of course, one must learn the dissection. But the vast majority of men can learn a dissection more easily because the instruments are more handy.

In regard to Dr. Pierce's remarks, the speaker would not think of saying that he has never left any tonsillar tissue. But he has given his work the best that is in him, and considers that is his patients' due. No tonsillectomy is a trifling affair. He considers tonsillectomy a very keen operation, worthy of the skill of the best surgeon.

The extension of lymphoid tissue, referred to by Dr. Pierce, from the postlingual tonsil into the fossa is governed somewhat by the amount that is removed. If the loop of the snare is too large, it must of necessity lie over a considerable portion of the postlingual tonsil, and if this is cut off you get a contracting scar, which is not desirable. If, however, the tonsil is dissected well down until it actually falls over into the throat, then the pedicle is quite small, and the snare can be put exactly over it. The amount of tissue to be cut in each case should be determined as an individual proposition.

In reply to Dr. Mikkelsen, the linear scar is produced by the conservation of membrane. We go as far as we can towards that end by saving all the membrane which can be saved. We only release that portion which is adherent to the tonsil, never from any part of the pillars. This membrane falls into the tonsillar fossa, which is tissue very well supplied with blood, and consequently granulates very rapidly, ultimately leaving only a rudimentary fossa. The covering process is like skin grafting. Fimbriæ are thrown out which meet at the central line, and there the scar forms. If you cut too much into the dense connective tissue at the lower pole, you get a contracting scar.

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LIII.

THE INDICTMENT OF THE TONSIL.*

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An indictment is the formal and official declaration, in writing, that an accused person has committed a crime. The grand jury of the state makes inquiry concerning the conditions existing in each county and reports to the court having jurisdiction in that county the crimes committed within its boundaries. This report, called in legal terms the indictment, names the accused person, describes his offense, specifies when and where it occurred, and appends the testimony by which the charge is sustained. The witnesses who give this testimony speak under the highest sanction and greatest responsibility. They must be rational, capable of intelligently comprehending the nature of the crime; they must have personal knowledge and clear recollection of the facts to which they testify; most important of all, they must be truthful. If their veracity be successfully attacked, they are ignored.

The indictment is an evolution due to experience in the administration of justice during many generations. Its form and its method—dignified, logical, convincing—are endorsed by the consensus of opinion in civilized countries, and they may be employed with much advantage when we are dealing with the examination of facts and the field is not jurisprudence, but medicine; and the inquiry relates not to persons breaking the laws, but to organs disseminating infections.

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*Presented as a candidate's thesis to the American Laryngological, Rhinological and Otological Society.

By following the analogy of the legal procedure regarding charges and proof, I hope to make it clear that the conclusions reached are not of a merely theoretic or academic sort, but are demonstrations resting upon testimony of the highest kind—that the witnesses corroborate each other. Hence the statements upheld by this concurrent testimony must be accepted as fully proven.

The charge against the tonsils is that, in addition to the obstruction to respiration, deglutition and phonation obviously caused by their hypertrophy and other abnormal states, they play an important part in the introduction and dissemination of pathogenic germs. They are guilty of complicity in the causation of many morbid conditions which destroy health and endanger life. This complicity may exist when there are no local symptoms of sufficient severity to apprise the patient that the glands are diseased. Indeed, there may be not only a lack of symptoms, but also a lack of any notable change in appearance, so that a casual inspection leads to a negative diagnosis.

It is well proven that a focus of infection, very active in its deleterious work, may exist in the crypts, while the surface of the organ shows hardly anything to excite suspicion. When a patient is asked concerning trouble with his tonsils he frequently gives some such reply as this: "I feel sure they are all right. Two months ago Dr. Blank examined them and said that he saw nothing wrong." Further questioning elicits the information that the examination occupied about two minutes: the patient opened his mouth widely; Dr. Blank, a physician doing much throat work, gazed into the fauces illumined by rays reflected from the pharyngoscope, presumably inspecting both sides and also the posterior vault; then he declared that he saw nothing wrong. That was quite true: the pathogenic processes were not in sight. The examination was an instance of the old, old fallacy: "Morbi non apparentes ergo non existentes."

There are some organs which are presumably healthy until proved morbid; but the tonsils are not in this class. In structure they are modified lymph glands so constituted as to be peculiarly liable to invasion by bacteria. As all food and drink passes between them, and all impurities of the respired air have free access to their surfaces, they are continuously exposed to contact with injurious substances in solid, liquid and gaseous forms. Practically all of them become more or less infected during the years of infancy and childhood, and very often the noxious germs find a nidus in the crypts, where, of course, they are not visible. The very name crypt means hidden. The tonsils can be pronounced sound only after a deliberate and painstaking examination, involving the use of the microscope and tests for blood pressure. To be safe in our diagnoses we must start with the presumption that some abnormal condition is present. Very often we begin with the disease in a distant organ and work backward to the tonsils, where the infectious process started. In the diseases hereafter considered, the charge of causation is in each instance supported by the testimony of very competent witnesses, references being given to their full original reports, here quoted in the forms of abstracts.

NEPHRITIS.

Dr. H. W. Loeb.[1] Emphasis was laid upon two statements: 1. Acute nephritis is a frequent sequel of tonsillitis. 2. This fact is overlooked by the majority of physicians. Dr. Loeb gave as illustrations detailed histories of four cases, all occurring in the families of physicians and carefully observed throughout their course.

1. A girl of thirteen years had annually for several years very mild attacks of tonsillitis. The last of these was prolonged for two weeks, but subsided without causing apprehension. A fortnight later she suffered from intermittent attacks of severe headache and her urine was tinged red. Examination showed albumin, many erythrocytes, pus, hyaline and granular casts; specific gravity 1009. Energetic treatment was ordered, but in a few hours there occurred an uremic convulsion which was succeeded by others during three days, when uremic coma supervened and the prognosis became extremely grave. Under large doses of jalap, elaterium and

magnesium sulphat, together with the electric light pack, consciousness returned; but the girl was so asthenic that the most careful nursing was required for eleven weeks before an operation was considered advisable. The tonsils were then enucleated. After this the albumin disappeared and the kidneys gradually became normal; but six months elapsed before recovery was complete.

2. Mrs. S., aged twenty-eight years, wife of a physician, had several attacks of lacunar tonsillitis. During convalescence from the last, headaches appeared, speedily followed by severe hemorrhagic nephritis, which required four months of hospital treatment before it was overcome.

3. Dr. R., a hospital interne, had bilateral otitis media and at the same time a tonsillitis which he considered so slight as to require no treatment. Nephritis developed insidiously, and when the first urinary examination was made the analysis showed a large amount of albumin, together with blood and numerous casts. The disease yielded only after three months of energetic treatment.

4. This patient also was a hospital interne, and nephritis following inflammation of the tonsils eluded the attention of both the patient and his colleague until a urinary test was made, when the disease was found already well developed. The patient recovered under eliminative treatment.

These four cases were studied by several able clinicians in St. Louis, and they concurred in the opinion that the tonsillitis was not only precedent but causal, and that the infection had passed from the throat glands to the kidneys, where it showed much greater virulence than in the tonsils.

T. G. Orr[2] narrates with full details a most instructive case. A boy, aged three years, was admitted to a children's hospital after two months' illness, gradually growing worse. The diagnosis recorded was: "General anasarca with liquid in pleural and peritoneal cavities, and hypertrophied adenoid and tonsils." The urine had a heavy cloud of albumin and many hyaline and granular casts. Despite treatment the edema increased, and at the end of three weeks both chest and abdomen were tapped. For five months, treatment, evidently judicious and faithful, was continued. Under restriction of drinks, hot packs, diuretics, etc., the edema would temporarily diminish, only to recur with any cessation of the eliminative measures. The serous cavities always contained some liquid and the urine was always albuminous. In hope of stopping the infective process the colon was flushed and all defective teeth extracted, but the child grew no better. As cultures from the nose and throat showed the staphylococcus, it was decided as a dernier resort to remove the tonsils and adenoid. This was done under ether, very little being given, on account of the patient's asthenic condition. Within forty-eight hours following the operation a remarkable improvement was shown in both symptoms and general signs. Ten days later the edema had disappeared, the appetite was good, strength was increasing, and the urinary albumin was greatly decreased. Soon afterward the boy was discharged as cured, his general condition being excellent, with clean throat, no edema and only a trace of albumin. Fortunately, an opportunity occurred about twelve weeks later to reexamine this patient. He then appeared in vigorous health, with a clean throat, no liquid in serous cavities, no edema, no albuminuria. The only vestige of his almost fatal nephritis was the presence of a very few hyaline casts.

But one rational explanation of this case is possible. The kidney disease was kept up by continual reinfection from the tonsils and adenoid, rendering futile the vigorous treatment pursued. As soon as this reinfection was stopped, the treatment became effective and restorative processes operated successfully. The surgical interference undoubtedly saved this child's life.

Allen Baines and George A. Campbell[3] report that the urine was examined, prior to performing tonsillectomy, in all opertions done in the Hospital for Sick Children, Toronto. In a large number of patients operated on during a period of twelve months, twenty-four had albuminuria, and nineteen of these had tube casts in addition. In twenty-two of these cases, both albumin and casts wholly disappeared in from one to six weeks after operation. In two cases the abnormal constituents continued present at the time of reporting, eight and twelve months respectively after tonsillectomy. In these two patients the renal disease had taken such firm hold that it persisted after the removal of the infecting agency which had caused it. The other twenty-two cases are obviously additional illustrations of the process of reinfection from the tonsils, whose baneful influence nullified all efforts to cure the nephritis until tonsillectomy changed the whole aspect, when recovery occurred rapidly.

It is clear that hemorrhagic nephritis is often due to tonsillar disease, and equally clear that the renal inflammation is often unsuspected until it has made great headway, because its prodromes are masked by the throat affection. The pyrexia, malaise, headache and backache, commonly present in the first stage of Bright's disease, are indeed observed, but they are habitually and quite naturally attributed to the tonsillitis. It is quite sufficient to account for them, and many careful and skillful men have searched no further for their cause and have thus overlooked the insidious progress of the graver malady until a rapidly developed edema, or even a uremic convulsion, has furnished alarming proof that the kidneys were seriously involved.

Urinalysis would prevent the diagnostic error, and, if there were no alternative procedure, I would advise it in every case; but we must bear in mind that there are practical obstacles in its way. To request a sample of the patient's urine, to get that sample, to have it examined chemically and microscopically—all these things consume time and virtually involve expense. Moreover, they impress the patient with the fear of a disease universally dreaded, and although, in the majority of cases, the test will show that this alarm is groundless, yet in many persons the interval of anxiety does harm—and we all know that it is much easier to excite fears of this sort than to allay them.

Fortunately, there is a better diagnostic procedure, one quite free from objection. This depends upon the fact, now well known, that hemorrhagic nephritis produces an extraordinary rise in blood pressure, nearly always as much as forty millimeters, while the rise in uncomplicated tonsillitis is slight. In view of this fact, I most earnestly advise that the blood pressure be observed at the initial examination of every patient affected with tonsillar disease. This procedure takes little time, requires no fetching and carrying to a laboratory, no help from any one but the laryngologist himself, and involves no expense. The patient is not alarmed, though usually much interested. Should he inquisitively insist upon some explanation, a sufficient answer is that the ingenious instrument applied to his arm amplifies the knowledge of his circulation partly supplied by the familiar clinical thermometer and count of his pulse.

If the sphygmomanometer shows a normal blood pressure, or a rise which does not exceed twenty millimeters, we may safely conclude that as yet no morbid changes have occurred in the kidneys. If the rise is between twenty and forty millimeters, prudence dictates a second observation within a day or two, when a fall in the scale may relieve us of further solicitude. If the rise is above forty millimeters there is danger, and an examination of the urine should be made as speedily as possible. It is believed that adherence to this plan of making a blood pressure test as part of the initial diagnostic examination, will disclose all those cases of intercurrent nephritis often unrecognized, and estimated by some as high as ten per cent of the aggregate of attacks of tonsillitis, and will save many lives; for while the kidney disease is sometimes slight and subsides spontaneously, it not infrequently presents a fulminating and lethal severity.

As an illustration of the great significance and value of the blood pressure test, I give the following incident, which occurred very recently: A physician with a large family practice remarked casually that he was having a "run" of patients with tonsillitis, three of them being in one household. He was advised to take the blood pressure in as many cases as possible and follow this up with urinalysis. As this doctor was examiner for a life insurance company, he had at hand all the apparatus required, and he laughingly promised to follow the advice, "to oblige a friend," though he thought it was making too much of a trivial matter; for he shared in the common error that tonsillitis is a trifling affair. Three days afterward he reported that he had taken blood pressure in nine cases, in none of which any complication had been suspected. In four of these he found (to his astonishment) an increase of over forty millimeters. Two days later the matter had grown serious. In five patients, whose blood pressure was nearly normal, urinalysis gave no indication of disease; but in the other four, where it had mounted so high, the urine contained much albumin, many tube casts and a large number of red corpuscles. These four young people, who had been walking about, esteeming themselves nearly "cured of the sore throat," were at once put upon energetic treatment for acute Bright's disease, and none too soon.

One other point deserves attention. May not high blood pressure in the course of tonsillitis or closely following it be due to something else than nephritis? This is possible, but not at all probable. Aside from nephritis there is but one common disease habitually associated with very high pressure: that is arteriosclerosis, and it belongs to the latter part of life, while tonsillitis is nearly always a disease of youth. The high figures upon the scale will almost uniformly point to nephritis, and if exceptionally we find that instead of this they signify sclerosis, the test has still been useful, for our diagnosis has been made more complete and the patient has in no way been injured.

RHEUMATISM.

The frequent association of tonsillitis with the initial stage of acute articular rheumatism has made current the phrase, "rheumatic sore throat." It was formerly believed that the poison causing rheumatism was inorganic in nature and first appeared in the blood, subsequently acting on different organs, interfering with their functions and later causing structural changes. The tonsils were observed to be affected early in the course of the disease, even before the joints, but both local lesions were regarded as secondary to a vitiated crasis of the blood. Bacteriologic studies have led to an inversion of this sequence and to the theory that pathogenic germs, chiefly the cocci, find lodgment in the tonsils, causing inflammation, and thence migrate to the articulations, producing the familiar phenomena of acute rheumatism. Autopsies upon those who have died of the disease, not infrequently show the tonsillar crypts to be inhabited by colonies of microbes, rendering it probable that these cavities have been foci of infection. It has been said, on the other hand, that very few clinicians have found such colonies during the patient's life. It is likely that very few have looked for them. Most of the authors say nothing on the subject, and their silence is significant.

Singer[4] gives facts gathered from sixty cases of acute articular rheumatism taken without any plan of selection, just as they came consecutively in clinical work. Microbes were found in the blood in fifteen per cent of these patients, and in the urine in fifty-five per cent. The staphylococcus and streptococcus were the most numerous.

ARTHRITIS OF VARIOUS ORIGINS.

Frank Billings, as the result of the study of seventy cases treated in the Presbyterian Hospital, Chicago, declares that the center of infection was most frequently a chronic streptococcus focus in the faucial tonsil. In advice as to treatment he gives first place to tonsillectomy.

David J. Davis.[6] This witness sums up his results as follows: "Extirpation of the diseased tonsil, or focus, leads commonly to marked improvement, or to complete relief. This points to the tonsil as a focus from which infectious material is being constantly disseminated. In the diseased tonsils a hemolytic streptococcus is found in nearly all cases."

SIMPLE AND EXOPHTHALMIC GOITER.

Charles H. Mayo,[7] in reviewing five thousand operations for these diseases, propounds the theory that the beginnings of thyroid hypertrophy may be a defensive effort of the organism to resist toxic invasions, and remarks: "Repeated tonsillitis is another disease in which an infection may have a bearing on the hyperactivity of the thyroid." The importance of this suggestion is increased by the fact that Dr. Mayo is habitually cautious in statement relating to etiology.

TUBERCULOSIS.

T. H. Halsted[8] declares that a tabulation had been made of the reports furnished by twenty-eight investigators. The total number of tonsils was nineteen hundred and eighty-six, and all were by the naked eye adjudged healthy, or merely hypertrophied. Upon critical examination it was proved that one hundred and nineteen, or 5.9 per cent, were tubercular. The percentage is doubtless much higher among tonsils obviously diseased. The tonsillar crypts frequently contain colonies of tubercle bacilli, which may remain dormant or may migrate to the cervical lymphatic glands and hence to the apices of the lungs.

DEAFNESS.

D. J. Gibb Wishart.[9] In the Victoria Hospital for Sick Children, Toronto, there were during the period considered one hundred and three operations for the removal of the tonsils. Few of the patients were brought in on account of sore throat, many because difficulty in breathing had alarmed the parents, and a very large proportion on account of otitis media and partial deafness. Dr. Wishart considers it a waste of time to work with astringent sprays and internal tonics. Tonsillectomy is his routine and very successful treatment. The only exception is in cases approaching puberty, where a spontaneous change in the glands may be anticipated at an early date. Even this exception is a partial one, and the author makes this significant remark: "In these patients approaching puberty, very careful judgment must be used, and it is better to operate than to run the risk of ear complications which may permanently disable the patient. For a comparatively slight enlargement may, by its tendency to promote catarrhal trouble, sow the seeds of chronic ear catarrh and promote early deafness."

Injury to the delicate auditory mechanism with its deplorable results is one of the dangers which one should fully appreciate when tempted, for any reason, to leave undisturbed a diseased mass of tonsillar tissue. Danger of extension to the middle ear is doubled by the fact that the disease has not only the usual channels through the veins and lymphatics by which to reach the ear, but has another road along which it can travel very rapidly. It can move by contiguity along the walls of the pharynx and up through the eustachian tube to the middle ear, every stage of the advance being through the superficial tissues, whose structures and surface are of identical character all the way.

NERVOUS DISORDERS.

M. Berest of Paris[10] attributes to the tonsils various neuroses, such as esophageal spasm, recurrent cough, spasm of the glottis, neuralgia of the tongue and blepharospasm. He found these to be cured or much ameliorated by tonsillectomy, after he had made a long and discouraging trial of other forms of treatment.

Dyspnea, dysphonia and dysphagia are the common habitual results of the obstructive effects following tonsillar hypertrophies. In regard to them it appears unnecessary to present testimony, not because it is wanting, but because it is superabundant. The harm resulting from obstruction is well understood and fully appreciated by every specialist dealing with the throat. Some indifference exists among our colleagues who are engaged in general practice, an indifference due to inadequate acquaintance with the subject, which may with them have attracted little attention. Interest in the matter should be awakened and information disseminated by every proper method. Efforts of this sort will speedily banish the indifference; for obstruction produces results both immediate and remote whose evils are clearly demonstrable, and when these are once apprehended they will be regarded in their true character by the earnest and capable family physician, who will cooperate with the laryngologist in preventing the development of many morbid conditions whose prevalence is due partly to neglect and partly to former ignorance of the etiologic part played by the tonsils.

The charges in this indictment might be multiplied, much more evidence might be brought forward, but what has been presented is sufficient to convince an unprejudiced mind that, by the consensus of professional opinion, the tonsils are held for the causation of many diseases.

As to the plea occasionally made that they may sometimes act as barriers to infection, the present state of opinion among those best qualified to judge seems to be that one expressed by Dr. Murtagh O'Doyle. He had been advocating tonsillectomy before a medical society, laying emphasis upon the dangers of infection, when one of his auditors asked the question: "You have given us several instances where the tonsils have been forwarders of pathogenic germs; but may they not, under other conditions, act as barriers? In your wide experience, have you not seen tonsils prevent infection?" O'Doyle seemed to ponder deeply for some moments, then replied: "Yes, I have seen a number of such tonsils; thirty-one, to be accurate. They are preserved in glass jars at my office. I have no doubt that they have prevented many dangerous infections, by their absence, since I cut them out."

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LIV.

REMOVAL OF FOREIGN BODIES FROM THE UPPER LOBE BRONCHUS.*

By Chevalier Jackson, M. D.,

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The bronchoscopic removal of foreign bodies from the bronchi, bloodlessly through the mouth, is so successful (over ninety-six per cent of successes) that the causes of failure deserve careful study. The author has previously considered the failures due to inability to find a small foreign body far down and far out, near the periphery of the lung in a bronchus too small to be entered with a bronchoscope. Next to these minute bronchi in importance, from the viewpoint of bronchoscopic difficulties, is the upper lobe bronchus, because of the angle at which it is given off from the main bronchus, and because of the ascending direction of many of its branches, which precludes their entry by a bronchoscope. Fortunately, the upper lobe bronchus is rarely invaded by foreign bodies. In the author's clinic there were only four invasions of the upper lobe bronchus in four hundred and eighty-two cases. This refers only to cases in which the foreign body completely entered the upper lobe bronchus, and does not include the relatively common lodgment of a foreign body at the orifice of the upper lobe, resulting from the narrowing of the subjacent stem bronchus.

It was formerly thought that a more favorable angle for entering the upper lobe bronchus could be obtained by tracheotomic than by oral bronchoscopy. The author has demonstrated the fallacy of this.†

The difficulties of removal of foreign bodies that have disappeared within the upper lobe bronchus may be summarized in the expression of their location relative to the bronchoscopic tube mouth as "around the corner." In the first three upper lobe bronchus cases the author succeeded in exposing the foreign body by displacing the spur or "corner" by lateral pressure with the lip of the bronchoscopic tube mouth, the head and neck of the patient being pressed far over and down toward the opposite shoulder, the axis of bronchoscopic movement being the upper thoracic aperture, not the larynx. This did not present a lumen image, but it exposed the intruder to view and rendered forceps removal feasible with the regular side curved foreign body forceps. In order to reach "around the corner" the author has had a new type of forceps made. As the jaws cannot be seen to close, as is the rule in bronchoscopic foreign body extraction, their closure should be watched in the double plane fluoroscope devised for the author by Dr. George W. Grier. Brief mention of the author's five cases of foreign body in the upper lobe bronchus follows:

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*Read at the meeting of the Eastern and Southern Sections of the American Laryngological, Rhinological and Otological Society, January 9, 1915.

†Report to the International Medical Congress, London, 1913, Section XV.

Case 1.—Girl of twelve years. Glass headed pin in left upper lobe bronchus. Point caused to project into left main bronchus by displacement of the spur with the lip of the tube mouth. Removed with side curved forceps (not upper lobe bronchus forceps).

Case 2.—Girl of eighteen years. Bone in right upper lobe bronchus. Found with tube and removed with side curved forceps (not upper lobe bronchus forceps).

Case 3.—Girl of six years. Peanut kernel in left upper lobe bronchus. Found with tube and removed with straight forceps.

Case 4.—Man of sixty-five years. Metallic body in left upper lobe bronchus. Located by the team work of the expert roentgenologist (A. F. Holding) working with the fluoroscope while the author worked with the bronchoscope. The foreign body could not be seen or reached by the bronchoscope, or felt with any instrument. As removal was previously tried by three other experienced bronchoscopists (Henry Janeway, Harmon Smith, Sidney Yankauer), this may justly be considered a failure of bronchoscopy. Even localization by the bronchoscope would not have been possible, had it not been for the skillful fluoroscopic cooperation of

Dr. Holding. When the author placed the tube mouth in the orifice of the upper lobe bronchus, Dr. Holding stated that the foreign body was located upward and outward from the tube mouth, which was also visible to Dr. Holding in the screen. This fixed the localization in an ascending branch of the upper lobe bronchus, and the bearings obtained by a lateral fluoroscopic observation by Dr. Holding demonstrated that it was an anteriorly ascending branch.

Case 5.—The last case, though not strictly an upper lobe bronchus case, deserves inclusion here because it presented the same mechanic problem because of the situation of foreign body with reference to the main bronchus. The case is also exceedingly interesting from other points of view. First, and most important, it is the only recorded case in which a diagnosis of probable foreign body was made without a history of foreign body and without a radiograph. The diagnosis was made by Dr. George L. Richards, who sent the patient to a radiographer to verify the tentative diagnosis, the basis for which will be given by Dr. Richards, who is present at this meeting.

The bronchoscope revealed a stricture of the right main bronchus about two millimeters in diameter. This was readily dilated with the author's bronchoscopic dilators, revealing a large cavity below, filled with thick viscid pus. After this was removed inspection of the interior of the cavity showed it to be formed of the main bronchial wall. The foreign body was not visible. Acting on the localization of the excellent radiographs of Dr. M. N. Tennis, the upper lobe bronchus forceps were passed and, reaching "around the corner," the foreign body was felt, grasped and drawn into the visual axis of the bronchoscope beyond the tube mouth, whence its removal with plain forceps was easy. It was found to represent the much corroded head of the tack. The elevation representing the shaft showed only black corrosion, with no sign of a fractured steel or iron surface. Sponging out the cavity brought away black specks, one of which resembled a point. The upper lobe bronchus forceps were then inserted for localization and a radiograph was taken. The forceps and bronchoscope were then removed and another radiograph was taken, to see if anything remained of the stem. Notwithstanding a most excellent negative, no trace of anything was visible. The patient left for his home in Massachusetts the same evening. As to whether the stricture will close again to such a degree as to require dilatation, only the future can decide.*

Of the author's other six cases of prolonged sojourn of a foreign body, none has required after-dilatation.

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*Eight months later the patient was in perfect health, having had no recurrence of symptoms.

LV.

EYE ADENOIDS AND THEIR RELATION TO THROAT ADENOIDS. THE AUTHOR'S MODIFICATION OF THE ADENOTONSILLECTOMY OPERATION.*

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It would almost seem as though one who approaches the subject of operation upon the lymphatic structures of the nasopharynx and throat should prefix his remarks with an apology for daring to treat a subject upon which so much has been already said. It is, however, the hope of the author that the following presentation of this important subject may not be entirely worthless. It will be his endeavor by the correlation of known facts and the presentation of certain steps in technic developed in his practice to establish his deductions as to the following dicta, and also to show that there is good ground for believing in the direct relation of the follicular conjunctivitis of children with lymphoid hypertrophies in the nasopharynx, as was first pointed out by Oertel[1] in 1912.

ANATOMY OF THE CONJUNCTIVA.

"The conjunctiva, a most important mucous membrane, joins, as its name implies, as well as covers, most of the parts in the front of the eye. It is a loose, lymphoid structure, continuous with the epidermis at the margin of the lid, and lining the inner surface of the lid, in which location it is known as the palpebral conjunctiva. Upon leaving the lids it forms the superior and inferior palpebral folds and is then reflected onto the eyeball, where it bears the name of ocular conjunctiva. This place of reflection is known as the fornix conjunctivæ or sulcus, of which there are two, namely, a superior and an inferior."[3]

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*Candidate's thesis presented to the American Laryngological, Rhinological and Otological Society, 1915.

"The lids are rich in lymphatics, which are connected with the vessels covering the face, with the parotid system, and perhaps with the submaxillary glands. Some infections of the conjunctiva are, for this reason, accompanied by soreness and swelling of the preauricular gland."[4]

"The lymphatics of the conjunctiva and of the lids are divided into those of the integument of the lid and those of the conjunctiva; both sets are united and, by means of superficial and deep lymph vessels, separated by the orbicularis oculi, conduct partly into the lymph nodes of the parotid region and partly to those of the submaxillary region."[5]

"The normal conjunctiva contains many small lymph nodes, the socalled solitary follicles. These are especially numerous in the region of the fornix, both above and below."[6]

ANATOMY OF THE THROAT.

The lymphatic tissues of the nasopharynx consist of numerous follicles of varying size which are composed of a delicate reticulum of connective tissue in which lie lymph cells or leucocytes.

Such aggregations are more or less definitely bounded by a connective tissue capsule and pierced with prolongations from the same. Besides these well organized bodies there are numerous collections of lymph cells which are diffuse in character and merge without definite boundary into the surrounding tissues.

The more highly organized nodes are arranged in a circle known as Waldeyer's ring. This includes above, the pharyngeal or Luschka's tonsil; below, at the base of the tongue, the lingual tonsil; lying between the pillars of the fauces and on either side, the faucial tonsils.[2] The more diffuse aggregations are very numerous throughout the whole of the mucous membrane of the nasopharynx and fauces. All of these structures communicate through a rich plexus of vessels with the deeper lymphoid structures of the neighboring tissues.

Relative to the function of these structures there has been endless speculation, but at present nothing definite is satisfactorily determined. Suffice it to point out that chronically enlarged tonsils or adenoids seem to predispose to those maladies which we believe find their portal of entrance through the mucous membrane of the upper respiratory passages. For this reason the lymphatic structures of the throat have by some been supposed to act as guards against invasion by microorganisms.

ADENOIDS OF THE CONJUNCTIVA, FOLLICULAR CONJUNCTIVITIS.

Follicular conjunctivitis is manifested by a hyperplasia of the small aggregations of lymphoid cells, solitary follicles, and is most marked in the fornix, both above and below. The hyperplasia is doubtless both simple, in the early and less pronounced forms, and numerical in those cases which become subacute or chronic, or in which the existing cause is present in greater degree. In many of the acute conditions of infection of the conjunctiva we naturally find swelling of these lymph nodes, but the term follicular conjunctivitis should, it seems, be rather limited to a condition of low grade irritation which continues over a considerable period of time, often years, and which presents no definite known bacterial flora as a basis. Authors of textbooks upon this subject are pleased to be indefinite.

As an example, Fox[7] says: "It is the conjunctivitis which appears periodically in large schools, asylums or prisons, and it is infectious." And again: "The symptoms are the same as in ordinary catarrhal conjunctivitis. The distinguishing feature is the presence of the hypertrophied lymph follicles."

Fuchs[8] says: "Follicular catarrh is characterized by the presence of follicles." Further: "The etiology of follicular catarrh has not up to this time been established. By some, contagion, by some, miasm has been assigned as a cause of the disease without any certain proof being brought for either one view or the other."

"The malady is found with especial frequency in schools, etc., in which many of the scholars are attacked by it at the same time. In many of these people the disease exists in an entirely latent way, as, in spite of there being a considerable number of follicles, the conjunctiva is not reddened and causes no sort of discomfort, so that the affection is first discovered by the physician's examination."

To this latter statement I wish to draw particular attention.

De Schweinitz[9] recognizes that "the descriptive term conjunctivitis, as applied to this affection, is usually not accurate, because, in fact, the signs of inflammation are generally absent." "The disease arises under the influence of bad hygienic surroundings, especially in pauper schools, where it may appear as an aggravated epidemic; but it is frequently seen in mild form, especially among children during their school years, particularly if they are subjects of anemia and chlorosis."

May[10] describes the condition in the following terms: "This disease, also known as follicular catarrh, is characterized by the occurrence of 'follicles,' with or without the symptoms of catarrhal conjunctivitis."

OBJECTIVE SYMPTOMS.

"The conjunctiva of the lower retrotarsal fold (less commonly also the upper fornix) presents a variable number of small, round, pinkish translucent bodies, each about the size of a pinhead; when abundant they are arranged in rows. These follicles consist of circumscribed aggregations of lymphocytes (adenoid tissue) identical in structure with the granulations of trachoma. On this account follicular catarrh is sometimes looked upon as an early stage of trachoma. But this is regarded as unlikely by most authorities, since there is neither papillary hypertrophy, cicatricial changes nor other sequelæ, no evidence of contagiousness, and the affection subsides without leaving any traces."

Ball[11] more rationally says: "The conclusion seems evident that folliculosis is to be regarded as an expression of adenoid activity incident to childhood and youth."

One cannot, however, entirely agree with the opinion that follicular conjunctivitis is due to normal adenoid activity, else all children would show the condition and not alone those who have been subjected to "unhygienic surroundings" and the like, as set forth by most writers.

"Adenitis, that is, inflammatory enlargement of the lymph nodes, whether due to soluble toxins or to direct infection, varies according to the nature of the irritant."[12]

We have the reaction of a given tissue to an irritant, and, dependent upon the degree of irritation and the time of its duration, we may have all forms of tissue changes from simple swelling to necrosis, softening and liquefaction.

That the pathology of the lymph nodes of the eye should essentially differ from that of lymph nodes elsewhere is not a logical conclusion. The changes with which we have to deal are cellular, and therefore the size of the structure has no bearing upon the fundamental changes that may take place within it. The basic principles that govern changes in the lymphatic tissues must apply alike to the delicate aggregations of cells which in the conjunctiva make up the follicles and to the larger bodies of similar structure that constitute the socalled adenoids of the nasopharynx.

"The stimuli which are able to excite growth and cell division are known only in part."[13]

The causes which excite growth in the lymph nodes of the conjunctiva in that type of malady under consideration are no less obscure than those which lead to proliferation and hyperplasia of the lymph nodes of the pharynx. While they may properly be said to be "incident to youth," they are no more so than are the causes of many other diseases of children. It would seem rational to conclude that follicular conjunctivitis is always inflammatory. The statements of authors, some of which have been quoted, that the signs of inflammation are generally absent, may, after all, be not based upon fact.

The classic definition that inflammation is a condition of a tissue characterized by increased temperature, hyperemia, pain and swelling does not apply to the more chronic types. The best illustration of that form of inflammatory reaction in which some of these conditions are absent is the tubercle of tuberculosis or syphilis, which in its early stages presents only the phenomena of hyperemia and swelling. Stengel[14] gives as the essentials of inflammation, hyperemia, excessive emigration of leucocytes from the blood vessels, and exudation, but modifies his definition by declaring that conditions vary according to the factors involved.

Many of my cases have presented a pale appearance, and, indeed, not infrequently these cases are of the most severe type. The pallor is due, not to an absence of inflammation, as one might be led to suppose, but rather to a condition of general anemia which is noticeable in all of the mucous membranes of the patient. That lymphoid hypertrophies are common in the poorly nourished child is a fact too well established to need more than passing mention.

Quite the most exact description of the pathology of follicular conjunctivitis which has come to my notice is that of Collins and Mayou,[15] which is quoted entire:

"In primary chronic inflammation of the conjunctiva and acute processes which are subsiding, lymphoid cells make their appearance. These at first are evenly spread beneath the epithelium, but if the inflammation continue and become very chronic, these cells increase in number and form aggregations which are known as follicles. They resemble in structure and function those found in the lymphatic glands in which the cells are similarly produced. The formation of these follicles is mainly limited to the fornices, where there is already an existing lymphoid layer; but they may occur elsewhere—on the tarsus and at the limbus, as in trachoma. Before the classification of the inflammatory diseases of the conjunctiva, according to the nature of the infection, this follicular formation was known as follicular conjunctivitis."

From the above it would seem evident that my contention that follicular conjunctivitis is always inflammatory is established. Surely, such an assumption places us on a more rational plane of thought, and may also point the way to a correct solution of the etiology, not only of hyperplasia of the lymphatic tissues of the conjunctiva, but of the nasopharynx as well. For when we turn to the consideration of hyperplasia of the lymphatics of the nasopharynx, we are again confronted by a mass of contradictory evidence as to the cause of such hyperplasia, inaccurate description as to its location and extent, and unsurgical methods for its treatment.

Of the diverse causes set down as productive of "adenoids" the following may be mentioned: colds, heredity, mouth breathing, hypertrophy of the hard palate, deviation of the nasal septum, a catarrhal condition of the nasal passages, the strumous diathesis, tubercular diathesis, exophthalmic goiter, rickets, syphilis, climate, irritating vapors, uric acid diathesis, diseases of the liver and kidney resulting in cyanosis, intestinal irregularities, worms.

It is not proper, even from the operative standpoint, to presume, as some have done,[16] that adenoids will group themselves alone into one distinct mass in the vault of the pharynx.

The student of textbooks would infer that the term adenoids refers alone to a mass of lymphoid tissue situated at the vault of the pharynx, and commonly spoken of as the pharyngeal tonsil. Here and there one finds mention of adenoids in the fossæ of Rosenmüller. No mention is made of those frequent conditions of innumerable lymphoid hypertrophies, not only in the vault, but over the whole surface of the oropharynx. They are often especially noticeable along the lateral folds of the pharyngeal mucous membrane, while in many instances the posterior surface of the posterior faucial pillar will be found thickly studded with them. Needless to say, the usual operative procedures do not suffice for such conditions.

It is not the purpose of this paper to discuss the etiology of either the adenoids of the eye, in follicular conjunctivitis, or those of the pharynx.

Doubtless many of the socalled causes are indeed important factors in the production of these conditions, and the theory of Oertel,[1] of a common infection of the lymphatic tissues of the eye and throat conveyed through the lymph vessels, may not be incorrect. It would, however, seem to be reasonably certain that, whatever the etiology, there does exist a uniform relation between eye adenoids and pharyngeal adenoids.

There is no dearth of authority for the assertion that the follicles of trachoma are histologically identical with those of the milder follicular conjunctivitis. Collins has noted the occurrence of trachoma "in children with a general tendency to adenoid formation."[17]

One may question whether even this noted and competent observer may not have been led to this conclusion through having seen cases of the less harmful malady. Certain it is that the common statement that all cases of follicular conjunctivitis recover and leave a normal mucous membrane is far from correct.

The writer might cite several cases from his own practice in proof of this assertion, and it is his good fortune to live in a section where trachoma is almost unknown. He must insist that it is only logical to conclude that even a mild form of irritation extending over a sufficient length of time must cause structural changes in so delicate a tissue as the conjunctiva.

To establish his claim of constant association of eye adenoids and pharyngeal adenoids the author, not depending alone upon his observations made in private practice and in the clinic of a hospital, has recently examined the children of a large school. Most of these children are from a factory district, and come from poor stock, live in more or less unhygienic surroundings and are poorly nourished. Probably for these reasons the percentage of cases found to be suffering with follicular conjunctivitis is high. So far as the school surroundings are concerned, they are ideal. The building is new, large and well ventilated, and the children receive competent supervision. No case of acute conjunctival infection of any nature is included. Several were observed. Most of the cases were severe so far as the eye manifestations were concerned. In none of them was there any question of diagnosis as between follicular conjunctivitis and trachoma.

Number of pupils examined	818
Number with follicular conjunctivitis	127
Number with follicular conjunctivitis having distinct enlargement of pharyngeal lymphatics to a pathologic degree	127

The number of cases is not large, but, in view of the uniform occurrence of adenitis of both the conjunctiva and the pharynx, must be deemed significant. In all but two of this series of cases there was also marked hypertrophy of the faucial tonsils. One case had undergone tonsillectomy and adenectomy a year previous. The results of the operation, so far as the tonsils were concerned, were excellent. In spite of this the pharynx is now filled with adenoids, and there is a severe grade of follicular conjunctivitis which will necessitate operation. A further study of school children is contemplated.

The various forms of curette employed for the removal of pharyngeal adenoids are murderous instruments indeed in unskillful or careless hands. Too often the operator is bent chiefly in displaying his adroitness rather than in doing the least possible harm to structures of the utmost importance, and uses the curette with an abandon and force which makes the observer shudder. The evils of scar tissue in the pharynx are too well known to need comment. What then must be the fate of the patient who has by the reckless use of the curette had his mucous membrane mangled and stripped from the pharyngeal wall? Such cases are all too common, and instead of mucous membrane with its normal secretion of fluids, one sees only a dry, glairy, red surface, not infrequently covered with scabs, a source of constant and life-long discomfort, and a menace to the sense of hearing and one may even say to life itself.

Syzmanski[18] mentions an ingenious method by which he sought to determine the amount of force exerted by various operators with the curette in the removal of adenoids. His experiments showed a range of from one to ten pounds. His own pressure was from six to eight pounds.

It is difficult to comprehend why there should be such a universal use of the curette except as a means for cleaning up after the chief part of the pharyngeal tonsil has been removed.

When we come to consider the removal of the faucial tonsils, we must also read with wonder. The vast amount of literature on this subject emphasizes its importance, and the variety of opinions as to the best methods of procedure point all too plainly to the fact that our opinions and operative technic are not yet perfect. It is even asserted by some that removal of a part of the tonsil only is a surgical procedure for simple hypertrophy,[19] and the tonsil punch is still figured in our textbooks, wending its way from one to another, though it has long since been discarded by most operators as an instrument that is obsolete.

The writer can conceive of no condition which warrants removal of a portion of the tonsil. When this is done the stump will often enlarge to perhaps the original size and come to operation a second time, or there will result a cicatricial mass with buried crypts which will give more trouble than ever. Neither can I agree with Borchers[20] and others, who advise finger dissection of the tonsil. The amount of force necessary for such a procedure must often be considerable, and Borchers admits that in many cases it will be necessary to resort to instrumental delivery. Many operators who use finger dissection finish the operation with either the snare or tonsillotome, and it would seem that dissection with the knife must be far more surgical in any case than the use of so blunt an instrument as the finger.

By many the removal of the tonsil is regarded entirely too lightly. Tydings[21] says: "There is not a more difficult procedure in surgery than tonsillectomy under general anesthesia." And the careful observer must agree with him, for many of the cases most in need of our assistance will tax our skill to the utmost, that operation being the most excellent which results in the removal of the offending organ with the least damage to the normal structures which surround it. As Hurd[22] points out, it is the small submerged tonsil that as a rule gives the most trouble, and to enucleate such an one without damage to the pillars and underlying structures is not always easy. We have all seen, and perhaps unfortunately in our own cases, such untoward results as are pointed out by Stucky,[23] who mentions numerous cases of deformities arising from faulty removal of the tonsils, and who considers the operation a major one, to be done in a hospital with careful surgical technic. In discussing tonsillectomy, Iversen[24] says: "Of the different methods of tonsillar extirpation, I would mention in particular the snare. It is claimed to be selective: that is to say, it squeezes its way through the connective tissues to better advantage. That this is not true can readily be seen from the removed tissues, and oftentimes the muscles of the pillars are mutilated, or deep-seated stumps remain which may bleed severely." One need only remark that the fault in such cases does not lie with the snare.

During the past summer a noted laryngologist in Europe exhibited to the writer with pride a tonsil he had just extracted with the tonsillotome, as a specimen of neat and thorough enucleation. To the question relative to tissue adhering to the tonsil, "What is this, doctor?" he replied, "Oh, that is only the anterior pillar; that makes no difference."

Quite other than this is the opinion of Hurd, in the article already quoted, who says: "Tonsillectomy ideally done should not injure the singing or speaking voice. On the other hand, injuries to the pillars, velum or uvula during a tonsillectomy may ruin the singing voice and impair speaking."

Franklin[25] recommends suturing the pillars in cases of bleeding, and claims that the resulting scar after such procedure is no greater than that which follows healing in the ordinary case. Quite the contrary is the case, as in many instances of pillar suturing the pillars may be entirely obliterated and an ugly mass of scar tissue remain on either side of the throat.

One must allow that there will arise cases in which pillar suturing to stop hemorrhage is an absolute necessity, but it should by no means be employed as a routine; rather only as a resort when simpler measures have failed. Even then the sutures should be cut at the end of twenty-four hours or sooner, as advocated by Hayden.[26] Care in operating is the best hemostat and produces the minimum of scar. While it is true, as Makuen[27] remarks, the tonsil that requires removal is always prejudicial to voice excellence, it is also true that in the removal of such tonsils we may by faulty methods do more harm to the voice than the offending tonsil would have done.

Cohen[28] goes to some length in his description of the method of ligation of bleeding points after tonsil extirpation. His method is entirely practical, and is doubtless in use by many surgeons. Certainly, ligation of a bleeding vessel in the throat is in line with rational surgery elsewhere. It is, however, by no means easy of accomplishment in many cases where it may be desirable, and the method of ligation with silver wire, to be later described, answers quite as well as the string ligation and is much more rapid and simple. The writer believes, with Cullom,[29] that no case of tonsillectomy should be allowed to leave the table until all hemorrhage is checked and the wounds entirely dry.

TONSILLOADENOIDECTOMY AS DONE BY THE AUTHOR.

In this operation the tonsils are usually first removed. My modifications of the snare operation need only be considered, as the usual methods of procedure are well known. The patient is thoroughly anesthetized, the choice of anesthetics being left to the discretion of the anesthetist. Chloroform is preferred, as ether stimulates the mucous glands and renders the operation more difficult by reason of the sloppy throat. The patient lies upon his back, with a small pillow between the shoulders, allowing the head to fall backward, to obviate the dangers of fluids being inspirated into the lower air passages.

The light used is a Nernst lamp upon a tilting stand. A mouth gag without a tongue depressor is used. The Green and other mouth gags with stationary depressor fail to give proper working room. They hold down the tongue, it is true, but the base folds up alongside of the tonsils so that a good view cannot be obtained.

The author uses his tongue depressor (Figure 1), which is so constructed that it pulls the base of the tongue forward and away from the tonsil and at the same time puts on a stretch the plica and pillars. The operator stands on the right side of the patient, tilts his head to the right, so that the field of operation is thoroughly illuminated and, having pulled the tongue to one side with the depressor described first, frees the right tonsil with Kyle's tonsil knife. This step is one that should be most carefully carried out, for upon its proper performance depends the success or failure of the operation. It should be our endeavor to save every possible bit of mucous membrane covering the tonsil. The knife is introduced at the posterior border of the supratonsillar fossa, and should go no deeper than the thickness of the mucous membrane. Section should follow downward along the edge of the plica, care being taken not to nick this structure. The cutting edge is now reversed, and a similar section of the mucous membrane only should follow the anterior edge of the posterior pillar. The tonsil is now ready to be engaged in the forceps. One with a narrow point should be used. Personally, I have obtained the best results with Lovell's tonsil forceps.

If the tonsil is properly freed, as above described, it will be completely everted by traction upon the forceps. No. 8 piano wire is used, the large size being better than a smaller, for the reason that it is stiffer, will better follow the tonsillar capsule and results in less hemorrhage. The loop is passed over the forceps and carefully guided around the margin of the everted tonsil. The author prefers the Kratzmüller snare. The loop is slowly tightened and steady pressure made until it cuts its way through the tissues. As soon as the tonsil is delivered a "bird's nest" gauze sponge is grasped with the author's dressing forceps (Figure 2), placed between the pillars in the bed of the tonsil and held there with firm pressure for a few moments. This is usually sufficient to control the hemorrhage. The sponge is left in place and the left tonsil removed in like manner.

The dressing forceps, above referred to, is of great advantage on account of its rigidity, and the shears handles allow of a certain, comfortable grip. An assistant to do the sponging is not always available and is, in fact, rather a hindrance than otherwise. I prefer to do my own sponging. The nurse keeps a supply of "bird's nest" or folded sponges on the sheet covering the patient's chest, and these may be rapidly picked up with the dressing forceps, as required. Dry sponges are used.

Care in sponging should be employed, as it is easy to denude the mucous surfaces of their covering by rough sponging and add to the discomfort of the patient during the period of recovery. If the steps of the operation have been properly carried out, we should now have a clean, dry wound, symmetrical upon either side, with the pillars and plica intact. The sponges are removed and if there is still tendency to bleed, the vessel is caught with a long hemostat and ligated by clasping about it a silver wire clip. The instrument used for this purpose (Figure 3) was, I think, devised by Dr. Harry Cushing for use in brain surgery. I have employed it for some years in all cases of tonsillectomy in which bleeding was not promptly checked by sponge pressure, nor have I been obliged to resort to any other method in a series of some hundreds of cases. The little piece of wire gives no trouble and is never heard of again. I have been asked if I was not afraid of having these clips find their way into the lower air passages. Of this I think there is no danger, as they are so light that they would not fall downward by gravity, but would rather adhere to the mucous membrane, even if they were free. It must also be remembered that when they slough off they are embedded in the mucus and exudate of the wound, and so are spat out by the patient. Their ease of application and efficiency recommend them, and after their use one may retire without the fear of being called to check a postoperative hemorrhage.

I have not for many years had either any considerable trouble in checking bleeding or a single case of postoperative hemorrhage. Care in removal of the tonsil, and surgical control by ligation with the silver wire clip, are, I think, responsible for my freedom from anxiety in this respect. Retraction of the anterior pillar and thorough inspection of the tonsil bed should be the last procedure before the patient leaves the table. Even the slightest bleeding should be entirely controlled by this time.

ADENOIDECTOMY.

The extirpation of the tonsil may be reasonably well done by many operators. I fear this is not the case when one comes to consider the usual methods for the removal of adenoids. The manner of use and dangers of the curette have been already mentioned.

That operation in the nasopharynx which removes most thoroughly the offending structures and which, at the same time, does the least harm to normal tissues is surely the best method. It is much easier for the surgeon to use a curette, trusting to his sense of touch, than it is to employ a method that will be more troublesome and time consuming. But our aim should be the most perfect end result, and not mere convenience. I venture the assertion that careful investigation will reveal a large majority of cases which come to operation that have not only a hypertrophy of the lymphatic tissues in the vault of the pharynx, but such a general lymphatic enlargement as has been previously mentioned. It has seemed to me that promiscuous and rough scraping with a curette in a situation where so much damage may be done is not worthy of our best surgical skill.

My method of procedure follows: The head is somewhat lowered, in order that blood may be kept from the throat. A suitable sized La Force adenotome is then introduced, and such tissue as it embraces is cut away. This instrument makes a clean, smooth cut, and the severed portion is secured in the box above the sliding blade. A sponge is grasped with the dressing forceps and held firmly in the oropharynx, thus blocking the blood from the throat. Blood that is swallowed tends to produce nausea. Bleeding through the nose will be free for a few moments and may be wiped away by an assistant. When the bleeding has been sufficiently controlled, the soft palate is retracted with my retractor. (Figure 4.) I have had this instrument constructed of thin metal, and find it answers its purpose admirably. The tongue is held with the tongue depressor by an assistant, and this gives a clear view of the pharynx almost to its vault. A small curette is now employed, under direct observation, to clean up the edges of the wound already made, or my roller forceps (Figure 5) is brought into play.

With this it is possible to crush and squeeze out the smaller hypertrophied lymph follicles in the same way that similar bodies are expressed from the conjunctiva. I have employed this instrument during the past two years, and I believe it has a distinct place in dealing with diffuse adenitis of the pharynx.

Investigation of the sulcus about the eustachian tubes is made with the finger, and any adhesions broken up. If necessary, a small ring curette may be used. Sponges are now placed in the pharynx until the bleeding is checked. As a final step, after inspection of the tonsil beds, the wounded surfaces, both of the pharynx and between the pillars, are swabbed with pure compound tincture of benzoin. This seems to allay the first burning pain which follows these operations. I do not remember who first suggested its use, but it is not original with myself. Beck[30] is, so far as I am informed, the only writer who has advocated operating on adenoids under direct inspection. He uses rubber catheters passed through the nose and out of the mouth, where they are held so as to retract the velum.

I believe my method gives quite as good a field of operation, and does away with the catheters, which must to a considerable extent block the nose and hinder the escape of blood by this channel. For this reason they seem to me objectionable.

CONCLUSIONS.

1. Eye adenoids (follicular conjunctivitis) indicate the existence of throat adenoids.
2. Hasty and rough surgery in the throat is productive of irreparable damage.
3. Adenectomy should be performed, as far as possible, under direct observation.
4. The roller forceps for diffuse pharyngeal adenoids is of value because it removes them with a minimum amount of damage to the mucous membrane.
5. The silver clip is the best general method of controlling tonsillar bleeding.

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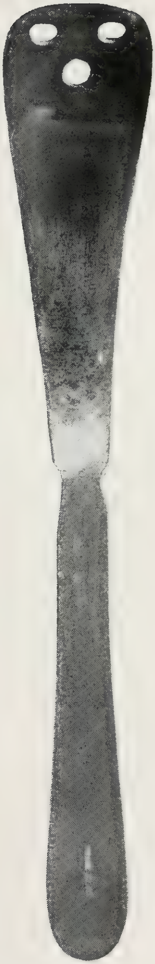

FIGURE 1.

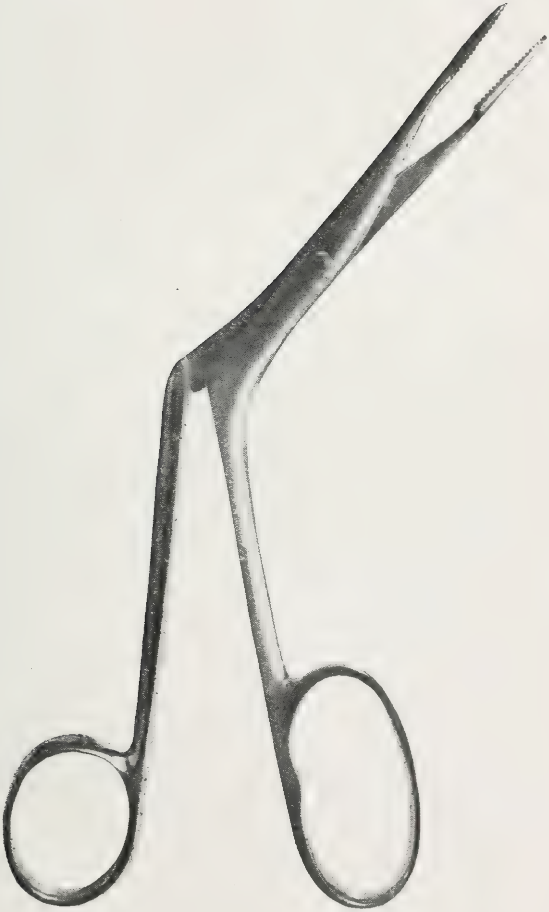

FIGURE 2.

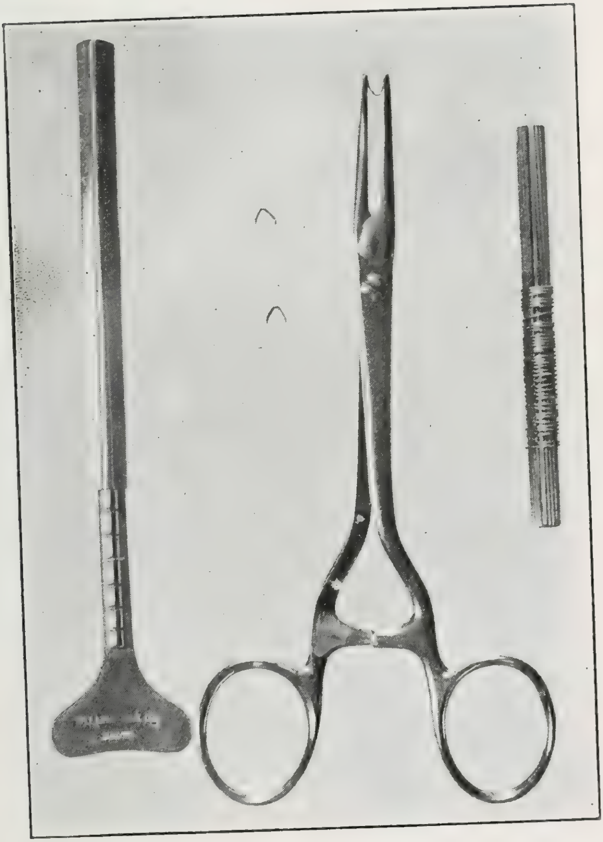

FIGURE 3.

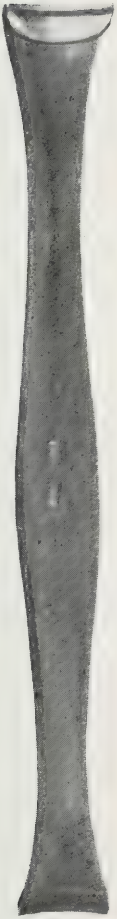

FIGURE 4.

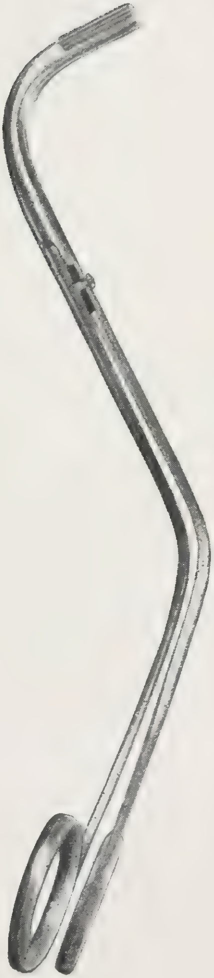

FIGURE 5.

LVI.

THE VACCINE TREATMENT OF SUPPURATIVE OTITIS MEDIA.*

By George Morrison Coates, A. B., M. D.,

Philadelphia.

Before presenting this paper I would like to say a few words as to the manner in which I became interested in the vaccine treatment of suppurative otitis media, and to admit that I am somewhat of an enthusiast. My deductions, therefore, as to the value of this form of therapy may be taken, if you see fit, with a certain allowance for the rose colored spectacles I may be presumed to be looking through. No one realizes more fully than I do that it is only too easy to see the kind of results one wishes for when one becomes an optimist in regard to a certain form of therapy; and too often unreliable statistics are given out, due to the desire of the therapist, honest though he may be, to prove the point he is interested in. Therefore, in seriously undertaking the clinical investigation of this subject, the tests were purposely made as rigid as possible by, as a rule, excluding other forms of treatment during the administration of bacterial vaccines, so that the results should have some weight in the consideration of the subject.

Though much impressed with the possible value of vaccine therapy in the management of suppurative diseases of the ear when Wright first read his epoch-making paper, it was some years before the clinical application was taken up seriously, although from time to time good results were obtained in ear cases with the use of autogenous vaccines. The greatest drawback was the difficulty in getting efficient vaccines made, since I am not myself a bacteriologist, and had to rely on our already overworked hospital laboratories. In the last year or two, however, the making of vaccines has been so much simplified that a good laboratory assistant, pathologic resident or clinical assistant can be readily trained to do efficient work; and also the use of stock suspensions, either commercial or of home-make, has proven of much value. Indeed, the first series of cases I observed was one of sixty-three consecutive suppurating ear cases treated just as they came to the out patient department of the Pennsylvania Hospital with a well known brand of commercial vaccine, and the results were so striking that I have followed the practice in private work with good results, and have undertaken a series of chronic ears treated with autogenous vaccines for comparison, with the results, so far, in favor of the former; but for this I think there are various good reasons.

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*Read in part at the meeting of the Section on Otology and Laryngology of the College of Physicians of Philadelphia, February 17, 1915; and in full before the Section on Ophthalmology and Oto-Laryngology of the Academy of Medicine of Northern New Jersey, March 22, 1915 (by invitation).

Since my title is the Vaccine Treatment of Suppurative Otitis Media, I will consider it under two headings, the acute (including the subacute), and the chronic types. Since it is impossible to make a sharp differentiation of these two classes, I have accepted, for the purposes of this paper, the arbitrary ruling that any unchecked discharge of over six weeks' duration belongs to the chronic class. I must also state that I shall confine myself entirely to the clinical side of the subject.

THE ACUTE CASES.

As I have frequently pointed out, when discussing this subject, we must not forget that most of these recover in a short time with any of the accepted forms of treatment, or even without any, and that, therefore, vaccines must not be given too much credit. On the other hand, we all, I suppose, see some of these cases that prove intractable, either from the fact that the opening in the membrana tympani fails to remain patulous and provide sufficient drainage, or that the discharge, in spite of constant effort, continues to flow and the case approaches the limits of the acute class without an arrest being effected. It is in this class of cases that a simple mastoidectomy or antrotomy is often advocated, in order to provide adequate drainage other than through the membrane, with the object of conserving the hearing and putting a period to the discharge. It is in this class of cases, also, that Mr. Heath's socalled conservative radical operation seems to have its greatest success. In view of the fact that so many of these cases can be successfully coped with by standard methods, it has never seemed to me worth while to employ vaccines as a routine or until I begin to get dissatisfied with the progress of the case, and then I have rarely been disappointed in the results obtained. Equally good results may be obtained with the autogenous or commercial products, though the preference should be given the former where obtainable, since their use is undoubtedly more accurate and scientific.

Conceding that the given case has had appropriate treatment for from a few days to a few weeks without improvement sufficient to justify the aurist in continuing the waiting policy, the vaccine treatment should be given consideration, since, at the worst, it can do no harm. In this connection it may be stated that no untoward result, except one which will be mentioned later, has ever been observed by the writer in the treatment of perhaps two hundred or more cases, necessitating the giving of over one thousand injections. Having resolved upon the use of an autogenous vaccine, such being procurable, it is first necessary to obtain an uncontaminated culture of the causative organism from the seat of disease, and I know no better technic than that recently published by Haskin of New York. All discharge is removed from the canal by gentle swabbing or by suction, and the canal and drum head sterilized with ninety per cent alcohol, with the addition of bichlorid 1 to 8,000, if thought advisable. If there is not an existing perforation, of course free incision must be done. Pus from the middle ear is now forced out by tympanic inflation or aspirated with the otoscope, and a small portion transferred with a platinum loop or cotton wound probe to an agar slant, which is then sent to the laboratory for incubation. The ordinary cotton-tipped wooden applicator usually furnished for the purpose is nearly useless for ear cases, as it is too large and clumsy and thus easily contaminated, or it may be impossible to reach the perforation, much less to pass through it. In 1911 Dr. Nagle of Boston gave out the technic by which she was able to make very successful vaccines. This was simply to incubate the cultures till the height of the growth was nearly reached, when it was washed off with normal saline solution, sterilized and counted. This method does not take into account conditions where there is more than one organism present—all are grown together, apparently. Most trained bacteriologists prefer to plate out the different organisms found, subculture them and then, if desirable, make the mixture afterwards. By this method much greater accuracy in dosage can be obtained, and it is the method we have followed.

Dosage is an arbitrary matter that must depend upon conditions of age, size and type of organism used. As a general rule, for an adult, about five hundred million staphylococci, B. pyocyaneus or diphtheroid, and from thirty to fifty million of the other organisms, are used for the initial dose. This is reduced to about a sixth for a child under three years of age, and increased for the varying ages in proportion up to maturity. The injection is made beneath the skin, after sterilizing with alcohol or tincture of iodin, with a fine hypodermic needle. The use of alcohol is preferable, because it does not obscure the following local reaction, which is used as a guide for the succeeding doses. As a rule these are given every three or four days, and the aim is to increase each one to keep about the reaction point, it being thought that the immunity raised in this way is the best and that it does not subject the patient to the danger of the socalled negative phase, the result of overtreatment or of slow immunization. Anaphylactic reactions have not been observed. In a case that responds favorably we expect to get, following the first dose, and occasionally the second, a local areola about the site of injection, which is usually the upper arm, varying in size from two to four inches, appearing in from ten to fifteen hours and lasting as long as forty-eight, accompanied by some slight induration and tenderness. Sometimes there is no local reaction at all. A general reaction may be obtained consisting in a slight rise of temperature, headache, possibly chilly sensations and lassitude for a few hours. In the ear itself the discharge usually increases at first, becomes thinner, and then may cease altogether. Secondary injections, if the dose is right, seldom show any marked reactions.

Homemade laboratory stock vaccines may be substituted for the autogenous product where available, providing the infecting organism can be determined, and often good results are thus obtained. The advantage is that treatment can be started at once instead of waiting seventy-two hours or more while the autogenous vaccine is in course of preparation. This does not contraindicate the administration of the latter when prepared, provided the case is not already cured by that time. It is our custom at the Pennsylvania and Polyclinic Hospitals, when a good potent vaccine is obtained, to keep all that is left over for use in this manner, and many times it has proved most serviceable, saving the time and trouble of preparing a fresh vaccine. So uniform has been our success with these two methods that if great improvement is not noted after a few injections, we consider our vaccine a failure or nonpotent, and proceed to make a new one from a fresh culture. At this time it may be found, also, that the type of the infecting organism has changed.

A third most useful procedure is the use of the much abused commercial mixed vaccine. Theoretically not scientific in its application, it nevertheless has many cures to its credit, and can be used where the two other forms of vaccine are not available, being kept in bulk in the aurist's medicine cabinet or instrument bag. These vaccines, usually called mixed catarrhal, or some such name, contain five or six of the commoner varieties of pusproducing organisms, and will check the infection in most acute aural suppurations. They are cheap, easily obtainable, keep well, and are always at hand for emergencies and for the use of the practitioner without access to a laboratory, or for patients who cannot afford even the five dollar fee now charged by many laboratories for the autogenous product. As a rule, these mixed vaccines contain the streptococcus, staphylococcus aureus and albus, pneumococcus, micrococcus catarrhalis and Friedlander bacillus in varying numbers per cubic centimeter, and there are several reliable makes now on the market. If improvement does not follow in a few days, a culture must be made to determine the infecting agent, for it may be none of those just mentioned as included in the mixture.

Whatever method is used, it seems to be the best practice to give one or two injections of the maximum dose after the ear has become dry, in order to insure permanency. A few typical cases may be cited from many as illustrations.

1. My very first case, five or six years ago, was a three-

year-old child at the Polyclinic with acute suppurative otitis media in one ear, of two days' duration, bulging drum, mastoid tenderness and moderate temperature. Incision released the contained pus, but for three weeks the same condition continued, the incisions, large though they were, closing rapidly and being reopened every few days. Operation was urged but refused, and so an autogenous vaccine was made up. Absolutely all symptoms disappeared after the second dose, and the ear has remained well and dry up to the present time.

2. A girl of eighteen was admitted to the Pennsylvania Hospital as a mastoid case, with aural discharge for ten days, and mild mastoid symptoms, but refused operation, and for two weeks remained in about the same condition. As a culture showed the staphylococcus aureus, a stock laboratory suspension of this organism was administered, and she was discharged well immediately after the second dose.

3. A private case in the country, some distance out of town, had acute suppurative otitis media, and both membrana tympani were incised twice. As the discharge then continued unabated for over two weeks and the hearing was becoming much impaired, and as, under the circumstances, I could not attend to the case personally, the family physician, under my direction, administered mixed commercial vaccine, and three injections were sufficient to clear up the condition.

4. An hysteric boy of eight years came to the dispensary with an acute discharge of two weeks' duration and a very tender canal. He was very hard to control, and after three attempts at ordinary forms of treatment, a mixed commercial vaccine of another make from the preceding was given. Four doses sufficed to give him a dry ear, all earache having disappeared after the second dose, and with infinitely less trouble to all parties than would have occurred with any other form of treatment.

5. A man with an infected traumatic rupture of the drum did not improve under ordinary treatment for three weeks, during which time the perforation enlarged greatly and the discharge became foul. Three doses of the same vaccine as the last gave him a dry ear and one that remained dry.

6. In a series of seventeen acute and subacute cases at the Pennsylvania Hospital in 1913-14, treated with commercial vaccines without other forms of treatment except incision

of the membrana tympani when indicated, one hundred per cent of dry ears were obtained in a short space of time. Several of these cases had fairly well marked mastoid symptoms.

THE CHRONIC CASES.

In dealing with the chronic form of middle ear suppuration we must not forget, in drawing our conclusions as to the value of vaccine therapy, that many of these cases are intermittent in type and are dry for long intervals at a time, and that this condition may occur during the administration and independently of the vaccines. Also that in the presence of extensive bony necrosis or of chronic mastoiditis with cholesteatoma, we cannot expect favorable results without first getting rid of these conditions by surgical means. As an adjunct to the mastoid operation their value has been proved, and according to the reports of Nagle, Haskin and others the same holds good for the otitis media. We must also remember that here, even more than in the acute type, there is often much contamination, and it is difficult at times to pick out the causative organism. Moreover, the type of infection may change from week to week, necessitating the preparation of new vaccines.

In a series of forty-six cases, treated just as they came to the out patient department of the Pennsylvania Hospital, thirty-nine dry ears were obtained by the use of commercial mixed vaccines, with an average of about five doses, or twenty days' treatment. The seven that did not respond to treatment were cultured out and all showed organisms not included in the mixture given—a very evident cause for failure. Most of this series had been treated by ordinary measures for long periods of time without result, and all were observed for a period of three months or more after the cessation of discharge, through the cooperation of the Social Service Department of the hospital.

To check up this work, my assistant, Dr. M. S. Ersner, and the writer last summer undertook a series of cases, selected under the same conditions, with autogenous vaccine treatment; Dr. Ersner making them himself in the laboratory of the Polyclinic Hospital. He had never done this work before, so that the results obtained justify the belief that the process is not such an extremely difficult one for an intelligent man. Some of our failures may also probably be set down to our early inexperience in this laboratory technic. This series was not so successful as the one just quoted, for, out of twenty-eight cases, dry ears that appeared to be permanent were secured in but a little over forty per cent. In this series a number of our cases were irregular in attendance and some were lost sight of altogether, as the Social Service was too busy at this time to be given all of this extra work of bringing back negligent cases. A number of points were brought home to us, however, that seemed of value. In the first place, cases that were not doing well, on being recultured frequently showed a change in the organism obtained, which might account for the failure of the first vaccine. Suppurating ears complicated by the presence of bacillus pyocyaneus are usually considered difficult or impossible to treat satisfactorily with vaccines, as these bacilli are considered, not as causative agents, but as saprophytes. West, of London, is the only authority that could be found in a search of the literature some time ago, that had been successful in these cases. Considerably to our surprise, therefore, in some of our most successful cases this bacillus was present, several times being the only organism recovered. The value of homemade stock vaccines was tested out also, for the vaccine prepared from a case showing a pure culture of staphylococci that was dry after a few injections, was given to four other unsatisfactory staphylococcic infections while awaiting the preparation of a fresh vaccine, and dry ears resulted in all four after a few injections. It must be remembered that these cases were all of the type that had previously resisted forms of treatment other than the radical operation.

The one untoward result observed was in a case not in this series but treated some months before. She had foul discharging ears of many years' duration, an eczematous condition of the canals that nearly occluded them and made it absolutely impossible to inspect the drum membranes, and an enormous infiltration of the auricles, more than doubling their normal size. She was cultured and a vaccine prepared, one dose of which was injected into the arm. The vaccine was a pure streptococcus. She promptly developed at the site of the injection a large abscess which incapacitated her for some time. The vaccine was at once sent back to the laboratory and tested for sterility. It was not sterile, having been underheated. This was not one of Dr. Ersner's vaccines, but was made for us before we undertook the preparation of our own vaccines. The sequel is most interesting. The abscess healed uneventfully, and so also did one of the ears, which became dry for the first time in seventeen years. The discharge from the other became very slight and odorless, and the eczema and induration entirely disappeared, so that in a week or so a fine view could be obtained of both middle ears. The auricles became normal in size, soft and pliable, instead of hard and board-like, and all scaling, crusting and itching ceased. Since then we have attempted to dry up the other ear—needless to say with fresh vaccines—but have not yet succeeded.

The treatment of postoperative mastoiditis with vaccines has been used successfully by many surgeons, and I would like, in this connection, to report two recent cases in which this method was used to advantage, and some conclusions that may be drawn from them. Both were complications of chronic suppurative otitis media.

Yetta Fierson, a Russian Jewess, a seamstress by occupation, single and twenty-one years old, had an attack of acute suppurative otitis media in the left ear in February, 1914, following an acute coryza. This was neglected and continued to discharge profusely until she first came under my observation at the Polyclinic Hospital on June 30, 1914, when she presented the following condition: The external canal was filled with a rather thick, offensive and somewhat greenish discharge. A large perforation existed through which protruded a polyp. This was removed and all regular methods of treatment were tried without success in even ameliorating her condition. Granulations were removed several times, and on August 1st we cultured the ear for the purpose of preparing a vaccine, but failed to get a satisfactory growth and had to make a second attempt on August 20th. This showed a pure culture of staphylococcus, and on September 3rd, seven months after the inception of the trouble, and two months after the institution of treatment, she received an initial dose of ninety-five million. On September 5th one hundred and ninety million were given; on the 11th, one hundred and ninety million again. The discharge was less in amount and thicker. The dose was reduced on the 15th, and on the 17th, when the discharge was again profuse, a new vaccine was started. This was again staphylococcus in pure culture. She failed to return for some time, but at last, on October 29th, she received two hundred and fifty million; November 3rd, six hundred and forty-five million, and on November 7th, twelve hundred and ninety million. At this time only a slight moisture remained, and following another dose of the same size on the 10th, the ear became dry for the first time. On the 14th one more dose, of the same size as the two preceding, was given for immunization, and she was considered ready for dismissal. The vaccines were all made by my assistant, Dr. M. S. Ersner, in the hospital laboratory, under the direction of Dr. John A. Kolmer.

On November 16th, two days after the last dose, she contracted an acute coryza from some exposure, with pain in the left ear, and presented herself at the hospital the next day with a bulging drum, although there was still some of the perforation remaining unclosed, marked mastoid tenderness, swelling and a temperature of 101.4°. The membrane was freely incised. She returned on the 19th with a normal temperature and a profuse discharge, but with her mastoid symptoms more marked. A culture from the aural discharge now showed streptococci in pure culture.

As there was no vacant bed in the Polyclinic, I transferred her to the Pennsylvania Hospital and opened the mastoid on the 20th. It was a typical case of acute mastoiditis of the Bezold type, with perforation at the tip with a small collection of pus beneath and considerable exposure of the lateral sinus. Owing to the extension into the neck and the exposure of the sinus the wound was not closed very tightly, although the upper part was allowed to fill with blood clot.

A culture from the pus in the mastoid, made by Dr. Richardson, resident pathologist, again showed streptococci, and I directed the preparation of a vaccine. This was ready on the 28th of November, and twenty-five million were given, followed by fifty million in three days. The ear became dry after the second dose and the mastoid healed kindly, she being discharged from the hospital on December 5th, although she might have gone at the end of the first week, having been kept for purposes of observation of the vaccine reactions. Two more doses of seventy-five million were given at four-day intervals for immunity. By December 20th the perforation was closed, and the mastoid wound was healed in three weeks from the operation, with very slight scarring or deformity.

I have recited the history of this case in some detail because it presents some points of interest out of the ordinary. The first part simply illustrates the course towards arrest of the average favorable vaccine case—i. e., a dry ear after from two to six doses. The failure of the first vaccine prepared was probably due to the fact that it was not a potent vaccine, although in what the lack of potency consisted is another question. It may have been overheated in the sterilization, or we may have been using too small a dose. The second staphylococcic vaccine dried the ear in three doses, but the doses were very much larger. Following the acute coryza the suppuration recurred, although this time the infecting organism was a streptococcus. To my mind this must not be considered a failure of the staphylococcus vaccine or in the light of a recurrence, but as a distinct new infection by a different organism, as cultures from the middle ear and mastoid uniformly showed the streptococcus in pure culture. This was further proved by the quick cessation of discharge after two injections of this vaccine and the rapid healing of the wide open mastoid wound, not to mention the almost sudden and complete closure of a rather large perforation which had existed for nearly eleven months and through which large granulation masses had protruded until the vaccine treatment was instituted, when they disappeared to return no more. Hearing is good, although she complains of slight tinnitus, and the appearance of the drum approximates normal.

The second case is that of a fairly well nourished child of fourteen months, who came to the Pennsylvania Hospital November 30, 1914, with a history of both ears discharging for several months, it being impossible to elicit the exact number. Moderate tonsil and adenoid hypertrophies were present. Five days before admission an acute mastoiditis had developed on the left side, and there was a large subperiosteal abscess. Temperature was 100.4°; pulse, 148, and respirations, 44. A medium sized perforation was present in each drum. Marked facial paralysis existed on the left side, the baby being unable to close the eye more than half way and the mouth being very much distorted. This had existed for several days. The leucocyte count was twenty-three thousand, and a culture from the ear showed streptococcus in pure culture. The mastoid was opened at once, a perforation of the cortex discovered and a large amount of pus evacuated. The mastoid process, what there was of it, was cleaned out and a blood clot dressing used with a small cigarette drain to the aditus. On recovery from the ether, on the subsequent day, the paralysis of the eyelid was somewhat less marked, but on the second day after operation the temperature rose to 106.4° and the child seemed pretty sick.

I think it was an error of judgment to use the blood clot method in a case involving the seventh nerve, and I hastened to repair this by a wide opening of the wound, which it distressed me to do, since it was healing nicely.

Pus taken at the time of the operation showed a pure culture of streptococci, and I had a vaccine made by my resident, Dr. Flick, and held in readiness. There were no other untoward symptoms except a very slight stiffness of the neck without either Kernig or Babinski signs, and the temperature, after staying around 104° for two days, yielded to sponging and reached normal on the fourth day after operation, December 4th. The facial paralysis was steadily improving, the eye closing well at this time. On December 13th five millions of the autogenous streptococcic vaccine were given, with slight local and no general reaction, and the patient left the hospital on the 16th. Further doses were fifteen million on the 16th, fifteen million on the 21st, twenty million on the 30th, thirty-five million on January 6th, and fifty million on January 13th. The left ear ceased discharging after the third dose and the right after the fifth. The intervals between treatments were longer, I believe, than is good practice, but the parents were very indifferent and it was difficult to get them to return at the proper times. The mastoid wound was closed in with little deformity in less than three weeks, and at that time only a trace of the paralysis lingered and the child had increased tremendously in weight and strength.

The feature of the case that I wish to call attention to is not the fact that the ear operated upon ceased discharging fairly promptly, nor that the wide-open wound healed in a short time, nor yet that the facial paralysis disappeared. All these happen frequently, but the drainage of one ear through the mastoid does not cause cessation of discharge from the opposite one, and I think the vaccine must be given credit for that much. It is worthy of note that the ear on the unoperated side was ten days longer in drying than was the other, due, doubtless, to the better drainage in the latter. There is one reason for the clearing up of the right, or unoperated, ear that is a possible explanation aside from the vaccine. That is, the fact of the rapid improvement in the child's general health following the operation, she having soon become rosy in color and having put on weight at an amazing rate. It is, of course, well recognized that improvement in general health is a great help towards the cure of a suppurating middle ear. In this case no local treatment whatever was used, the child being very unruly and difficult to handle. I am inclined to attribute the arrest of the discharge to the vaccine rather than to the child's physical condition, and believe that the improvement in her general health was largely due to this form of therapy, as it has been noted by Nagle, Haskin and other observers, and I can confirm it myself, that there is a frequent gain in weight and general improvement in condition following the administration of vaccines.

In discussing the results of vaccine therapy, at least in these cases, I have been careful not to use the word cured, knowing full well that relapses may occur and that the immunity established is of uncertain duration—that reinfections are prone to take place, as in all of our chronic suppurative cases. So, as we use the word "arrested" in pulmonary tuberculosis, and "relative cure" or "without symptoms of recurrence" in cancer, we must use some term in otitis media less definite than cure, although I believe these cases, many of them, to be really cured, and that subsequent outbreaks of suppuration are due to a repetition of the original process of infection, one that is liable to happen to any ear. This is what happened to the first case reported, I think, as the second attack was due to a different organism, the streptococcus. And I think, further, that if it could be tested out, we would have found her immunity to the staphylococcus active enough to have prevented a reinfection from that type of organism.

I want to say one word about the dosage used. It will be noted that in the first case we used a minimum initial dose of ninety-five million staphylococci, and a maximum dose of twelve hundred and ninety million was given without producing any marked reaction. Larger doses of the staphylococcus group are necessary and can be used with more safety than any of the other organisms, and smaller doses of the streptococcus, as shown in our postoperative treatment, where the starting dose was but twenty-five million in the adult and the largest dose seventy-five million, also given without reaction. In fact, it has been of rare occurrence in my vaccine work to obtain any reaction other than a small area of congestion about the site of injection, lasting a day or two, with occasionally a slight rise of temperature or a little headache. The larger the dose the patient will stand without severe reaction, the better the result will be; but of course that must be regulated, not only according to the organism employed, but by the condition of the patient, age, size, etc. In the fourteen-month infant the initial dose was five million and increased five million about every fourth day up to fifty million, though her irregularity of attendance somewhat prolonged the treatment.

It has become my usual habit, when finding pus in the mastoid, to have a vaccine prepared and held in readiness for emergencies, or for treatment should convalescence be unduly prolonged, although these two cases are the first of this kind that I have used them in. In a well ordered laboratory it is not a matter of great difficulty or loss of time, and even if the vaccine is never needed, nothing is lost. And, besides, it may be held for stock use.

Of course there is nothing new in this treatment of postoperative mastoiditis and chronic suppurative otitis media with vaccines. Many have used the method, but there have not been many reports published that I can find. Braislin, in 1913, reported six cases of complicated mastoiditis so treated, with satisfactory results in five. And still earlier, in 1910, McKernon reported the satisfactory employment of autogenous bacterins in cases of mastoiditis complicating scarlet fever and measles, in which type of case he found ordinarily very much delayed healing, while with the use of bacterins the time of convalescence was shortened to about that required for healing in cases not complicating the exanthemata. He notes also, as might be expected, from the shorter time required for healing, that the resultant scar was very much less disfiguring, and that the discharge from the middle ear was easily controlled and the membrana tympani rapidly restored to normal.

Of course failures with vaccine treatment of any disease will occur—there is no such thing as a cure-all; and failures may be due to excessive necrosis, chronic mastoiditis and cholesteatoma, possibly labyrinthitis with insufficient drainage, or defective drainage from the middle ear itself, and most frequently, I think, to improperly prepared or administered vaccine. It is no easy thing to get the underlying organism from its recesses in the middle ear without contamination; the vaccine must be skillfully prepared and especially not overheated in sterilization, or its potency will be reduced or destroyed. It is needless to remark that neither must it be understerilized, or severe reaction and infection will result.

LVII.

A CASE OF RIGHT ABDUCENS PARALYSIS FOLLOWING ACUTE MASTOIDITIS—GRADENIGO'S SYNDROME.

By Harry L. Myers, M. D.,

Norfolk.

This case is reported, not because of its being unique, but rather because of its being a typical example of that group of symptoms and functional disturbances which Gradenigo has described, and which are known to us as Gradenigo's syndrome. The principal manifestations are purulent discharge from the ear, abducens paralysis, neuralgia, pain over the frontal and parietal regions. As this was the first case of the kind in my experience, I searched the limited amount of literature at my disposal, in the hope of finding some explanation for its occurrence, and was rewarded by finding a most excellent article by Dr. Harold Hays, which he read before the New York Academy of Medicine, Section on Otology, in February, 1913, giving an excellent digest of the subject up to that time.

Dr. Hays reports Dr. Chas. E. Perkins as having had six cases during the winter of 1913, and that he had collected ninety-five from the literature. He also reports a most interesting case from the pen of Dr. John R. Page, seen in the service of Dr. Robert Lewis at the New York Eye and Ear Infirmary.

This case was particularly interesting, as the signs and symptoms were indicative of quite a grave condition—pain over right side of head, nausea and vomiting for six days, free purulent discharge from canal, temperature varying from 100° to 105°, slight traces of albumin in urine, slight papillitis in right eye and diplopia, developing six days previous. Despite these symptoms there was no mastoid tenderness at any time, but mastoidectomy was performed on account of the sixth nerve paralysis, the high temperature, peculiar symptoms, etc. "The mastoid was found to be quite sclerotic, with only a few fairly large cells which were filled with granulations. No free pus was found; the sinus was exposed throughout a great part. No dura was exposed. The antrum was opened and curetted out, the tip was completely removed." Lumbar puncture was performed on the table, and fifteen cubic centimeters of clear fluid was withdrawn—this was free from albumin, and the culture from it was negative after twenty-four hours. The following day temperature was 101°, discharge lessened, patient reports diplopia less marked. There is a well marked nystagmus on rotation of eye to left. Patient went on to speedy recovery.

Quoting further from Dr. Hays' article, Perkins in his paper remarks that intense headache, "especially in frontal region, severe pain in eye or deep in orbit, neuralgia of the fifth nerve, or paralysis of some of the muscles supplied by it, are symptoms, one or more of which have been noticed in fifty-five out of the ninety-five cases reported." This means that there is some interference with the Gasserian ganglion by the process going on at the apex of the petrous bone.

Dr. John Dunn has kindly allowed me to append brief notes of three cases he has seen, as follows:

Case 1.—Male, aged seventeen years. Mastoiditis, right side, with sinus involvement. Paralysis complete of the right external rectus, appearing after operation and entirely disappearing after a few weeks.

Case 2.—Girl, aged twenty years. Radical mastoid. There appeared the day following operation, or first noticed at that time, a right internal squint. There was no loss of motion of the right external rectus, but the right eye turned in toward the nose whenever both eyes were used for usual purposes. This condition was still present three or four years after the operation. Dr. Dunn has doubts about this being a typical case, and thinks it might have been an old squint of childhood which had reappeared as the result of the chloroform and bandaging of the right eye. He had seen a similar occurrence in a young man operated on for pterygium, the operator having bandaged the eye after the operation. In this case the refractive error was high, while in his own case it was only 1.0 D.

Case 3.—Female, aged twelve years. Simple mastoid operation; complete paralysis of external rectus of corresponding side. First noticed paralysis three days after operation. When last seen, about one month after operation, the paralysis had practically disappeared. This disappearance was gradual.

In none of Dr. Dunn's cases were there present any symptoms of involvement of the Gasserian ganglion. He mentions the well known fact that herpes zoster ophthalmicus often occurs as a complication of paralysis of one or more eye muscles; more often involving the third than the abducens, however.

Many authors offer testimony of the involvement of the eye muscles and even the facial as a complication of zoster. There was in the case I report, however, no symptoms of this trouble except the intense neuralgia.

My case is as follows: On October 7th, N. D., female, white, aged eight years, was brought to me suffering with acute catarrhal otitis media of the right ear. She had had some pain the previous night, but was comfortable when I saw her. The membrane was pinkish but not bulging, and I advised a cathartic and rest in bed. The child was pale and badly nourished, and gave a history of having had one or two previous attacks of earache at twelve month intervals. The membrane, however, had never ruptured, and the attacks only lasted for three or four days. The tonsils were hypertrophied, ragged and diseased, and there was quite a good sized adenoid hypertrophy; despite this the mother said the child had never had difficulty in breathing. I advised her, however, to bring her back in two weeks, in case she had no trouble with the ear before that time, and I would then remove the tonsils and adenoids. The earache never reappeared, and in about two weeks I removed the tonsils and adenoids under ether, as the ear had apparently become entirely normal, both in appearance and function. The following day patient left the hospital and the same night began to suffer again with pain in right ear. Two days after this I was called, as the pain had not ceased and the temperature was 102°. I found the membrane bulging, and a free paracentesis was done. This relieved pain and a free discharge began.

There was slight tenderness over right mastoid. The afternoon of the next day the temperature was again 102°, and tenderness was increased. I then sent patient to hospital and opened the right mastoid. No free pus was found, but there was a large cell above and behind the antrum filled with granulation tissue, and the whole cellular structure of the mastoid was beginning to show granulation and was soft and very vascular. The mastoid cells were cleared out and the entire tip removed; the sinus outlined and dura exposed over a small portion of sinus where the inner plate was softened. The sinus looked healthy, and no further bone was removed. The wound was sutured above and packed with iodoform gauze. The operation was performed at noon on October 28th. From this time on for five days patient made rapid improvement, slept well, temperature varying between 99° and 101°, the latter being the highest recorded at any time during her postoperative period. The pulse ranged between 90 and 115, generally about 90.

On the night of November 4th the patient showed great restlessness and was fretful; the temperature, however, showed no important rise, being only 100°, pulse 106, respiration 24. The first dressing had been given on the previous day, and I felt that the restlessness was possibly due to some discomfort from that, so disregarded it.

November 5th. Patient very restless, fretful and nervous, and complaining of great pain over supraorbital region and in right eye. Wound dressed, sutures removed—found everything in good condition. Had blood examination made for malarial parasite on account of the neuralgia. This was negative. Aspirin, grains two, controlled headache. Paroxysmal neuralgic attack in brow and extending to right ear recurred about 1 a. m., lasted a short while, and patient slept latter part of night; and from this time to afternoon of next day, patient was bright and comfortable. At 6:30 p. m., however, she had a slight return of pain, which quickly subsided under two grains of aspirin.

November 7th. No discomfort in forenoon, but return of neuralgia, and quite severe, at 1:30 p. m., lasting at intervals until 9 p. m., despite aspirin.

November 8th. Patient comfortable, wound dressed; temperature, normal; pulse, 88; respiration, 20. Allowed to sit up.

November 9th. Patient had a good day and night. Temperature, normal. Patient allowed to go home.

From this time the patient was brought to my office every other day for dressing, and her mother reported that while she had had no rise of temperature or other signs of trouble, her neuralgia came on more or less severely every afternoon. The child's appearance was not good, and she showed the effect of suffering, which was so great at times that it became necessary to use one-eighth grain of codein with the aspirin to obtain relief.

On November 26th, nearly one month after the operation, and more than three weeks after the neuralgic symptoms appeared, she complained of diplopia, and I discovered that there was complete paralysis of the external rectus muscle of the right eye. On account of this unusual and, to me, alarming occurrence, her persistent headaches and her ill appearance, I feared a cerebral complication, and brought her again to the hospital. There an exhaustive neurologic examination was made by Dr. William B. Newcomb, without throwing any light on the trouble. The sensory and motor conditions were perfect, reflexes normal, eye grounds and pupillary reflexes normal, the only abnormality being the right abducens paralysis and the affection of the fifth nerve. Lumbar puncture was done, draining off several cubic centimeters of perfectly clear fluid, under no pressure, which proved sterile. Blood test showed no great leucocytosis. Temperature, 98°; pulse, 88; respiration, 22. Patient was given aspirin, grains two, every four hours; urotropin, grains five, twice daily. Codein sulphat, grain one-eighth, p. r. n., to control neuralgia.

She was very bright between the paroxysms of pain. Temperature remained normal, and under the treatment, supplemented by syr. ferri. iodid, her attacks grew less severe and frequent until November 23rd, when they disappeared altogether and she was looking very much better. She was allowed to return home on November 27th. There has been no recurrence of the attacks, the paralysis has gradually improved, and at this time is almost unnoticeable. The child is rosy and well.

The etiology of this peculiar and alarming train of symptoms, especially alarming when occurring in conjunction with mastoiditis or following operative procedure for the same, is unfortunately obscure. We know the general etiology of acute acquired paralysis of the ocular muscles to be either intoxication, infection or traumatism. I am inclined to the belief that intoxication or toxemia is the underlying cause of these cases, together with traumatism when the mastoid is sclerotic, and considerable force must be applied by chisel and mallet to open the bone. In my case, however, no force was necessary, as the bone was soft and the principal work was done with curette.

We are all familiar with the fact that ophthalmoplegia externa occurs in lead poisoning, alcoholism, ptomaine poisoning, etc. It has also occurred in migraine—here the symptoms of neuralgia almost always precede for a long period the paralysis of the ocular muscles. The intoxication theory at least seems to fit my case as a general etiologic cause, but just why the fifth and sixth nerves should be the only ones affected in this class of cases is to me most obscure. If we are willing to admit traumatism as the cause, the explanation would be simpler, as the Gasserian ganglion and the sixth nerve are very close together at the apex of the petrous bone, and an effusion in this region from traumatism could explain the involvement of the two nerves. The purulent otitis media, the third symptom of the syndrome, could only affect these nerves by direct extension to the dura or brain at the apex of the petrous bone. However, the mildness of the nervous symptoms in my case would certainly seem to exclude this, or it must affect them indirectly by the toxemia produced. Had there been evidences of herpes zoster ophthalmicus, I should have better understood the paralysis of the abducens. I admit that this may have been a typical case of zoster, but as I believe that toxemia is a great factor in this, it brings me back to the same conclusion as to etiology.

Gradenigo's conclusion is that from some cause a circumscribed leptomeningitis is produced at the tip of the petrous bone. Lubet Berbon objects to the theory of intracranial lesion, and believes its origin to be reflex. Bonnier concurs in this opinion. Many celebrated authorities believe that sinus involvement or intracranial lesion of some kind probably exists, among these Habermann and Jurgensmeyer. Urbantschitsch rather holds to this theory, but admits possibility of reflex cause. Spira has observed it following la grippe. Schimanowski reports a case in the course of a diffused external otitis. Geronzi believes it due to toxemia. Finally, Baratoux, in the *Archives of Laryngology,* after a detailed historic study of the question, concludes that it is reflex in origin. The advent of these symptoms into a case one has operated upon for what seems to be an ordinary one of simple mastoiditis, must necessarily be somewhat alarming, and a wider study and discussion of this subject will, I am sure, not be without profit to every otologist.

LVIII.

A CASE OF TERATOMA OF THE TONSILLAR SPACE REMOVED FROM THE THROAT OF A BOY TWO DAYS OLD.

By William C. Braislin, M. D.,

Brooklyn.

Congenital tumors may occur at any point of the body, and while not uncommon about the head and neck, they seem to have been reported in the throat with extreme rarity; in fact, in a search through the catalogue of the Surgeon General's Library at Washington, I have been unable to find a case of teratoma attached, like the following, to, or in the place of a tonsil, as here reported.

Teratoma may be classed, in a sense, with congenital deformities, with which they are at times associated, though the lesser congenital deformities, like supernumerary auricles, unclosed bronchial clefts and others are much more common. The structure of a teratoma usually contains several varieties of extraneous tissues, glandular, cartilaginous, angiomatous, connective, as well as bone, skin, hair, teeth and muscle.

Several years ago I reported before this society[1] a case of teratoma which had completely occluded the external auditory meatus. In that case the tumor was removed by making an incision behind the attachment of the concha and dissecting out the growth subcutaneously. A photomicrograph of a section of the tumor was presented in the report referred to.

A brief history of the case of teratoma of the throat is presented as follows:

I was called in consultation with Dr. Thos. F. Mylod of this city to see a boy, born the preceding day, who was reported to be breathing with difficulty and unable to nurse. The child was breathing noisily, its color was more dusky than that of a healthy infant, and it was evident from its labored breathing, depression of the tissues above the clavicles on inspiration, restlessness, etc., that an obstruction of a serious nature existed somewhere in the respiratory current. On examining the throat the left tonsil was seen to have the appearance of an enormous hypertrophy, of about the size which one might see in a child of five years with enlarged tonsils. The growth was smooth and rounded, showing no evidence of crypts, and appeared to contain blood vessels of a size larger than is evident in enlarged tonsils. The soft palate was displaced upward and toward the opposite side. The left tonsillar space and the arch of the oropharynx were nearly filled with the foreign growth. Another anomaly of interest was the presence of a bifid uvula. The presence of the enlarged vessels and the unusual appearance of the tumor, together with the fact of its presence in the throat at birth, enabled us to recognize a congenital tumor, and it was named, tentatively, a teratoma. The presence of angiomatous tissue in the growth was suspected, as indeed was later confirmed by the pathologist. With the possibility of fatal or depressing hemorrhage in mind, it was determined to tie off the base of the tumor as a preliminary measure, which was accomplished with two strands of catgut looped around the base, without the aid of a needle. The compression upon the growth which the firmly drawn loops of gut afforded operated at once to partly diminish its obstruction to respiration. The breathing was noticeably freer and the blue color of the baby's skin was less marked. It was, therefore, deemed wise to postpone for a few hours its removal. This was accomplished the next morning, with a wire loop and snare. The bleeding was negligible. The soft palate at once assumed its normal position. Subsequently the child's color become pink. It was reported to me that shortly after, the baby took food without difficulty. The child has been healthy since.

The growth removed, was submitted to Dr. Archibald Murray, of the Hoagland laboratory (at that time also pathologist of the Brooklyn Eye and Ear Hospital), who found in it cartilaginous masses, extraneous glandular tissue, angiomatous tissue and other evidences which led him to make a diagnosis of teratoma.

REFERENCE.

1. Braislin, Wm. C.: Trans. Ninth Annual Meeting, Amer. Laryn., Rhin. and Otol. Soc., p. 116.

LIX.

COMPLETE CLEFT PALATE WITH HARE LIP.

By Owen Smith, M. D.,

Portland, Me.

The members of the American Laryngological, Rhinological and Otological Society who are particularly interested in oral surgery will, I am sure, be ready to listen to a paper which advocates and describes in not too prolonged detail a promising and, so far as my experience goes, successful method of restoring the floor of the nose and the roof of the mouth in those persons unfortunate enough to be born with cleft palate. At a time when oral surgery had not made its appearance in medical practice as a specialty, the general surgeon with more or less experience undertook to operate upon cases of this sort, but as a unit they have not adopted a uniform or apparently satisfactory means of treating them. For that reason, therefore, the burden of assisting in solving this difficult problem lies at present with those members of this society who specialize in this branch of surgery.

Twelve years ago I began work upon cleft palate as part of my nose and throat surgery, and from the considerable experience thus obtained I have become reasonably familiar with the different underlying principles involved in the surgical and dental methods of treating this condition. Careful study of the operative technic of today shows that three distinct methods, with minor modifications, are being used in the surgery of the palate.

First, elevation or separation of the soft tissues of the palate and suturing the denuded edges together in the middle line, as advocated by Langenbeck and Warren.

Second, flap elevation, reflection or rotation, as advised by Lane.

Third, forcible closing together of the cleft by lateral pressure and retaining the parts in place by heavy metal sutures, as suggested by Brophy.

A selection must be made from one of these plans, and the rhinologist knowing the functions required of the nose and throat is in a position to judge which one restores the parts more nearly to the normal.

Dr. Fillebrown, formerly professor of dental surgery at Harvard University, for many years used quite successfully the first method with his modifications, but was compelled to wait until the patient was some months old, six or more, before attempting operation. Even then failures to get union were frequent, and long disuse of the muscles made functional restoration of the parts impossible. Professor Brophy of Chicago, also a dentist, designed the third plan, and was quite successful in getting union in very young infants. The superiority of the second or Lane method of operation is, in my opinion, so great that I hope this paper will be instrumental in its becoming more generally adopted in this country and that it will receive the endorsement of this society. Having operated upon more than two hundred cases and carefully tried all three plans of procedure, I can unreservedly commend the operation suggested by Lane. I have watched Sir Arbuthnot and Dr. Fillebrown at their work and have seen their results. I have not seen Professor Brophy operate, but have had an opportunity to examine three cases presented by him before the American Medical Association. All of these presented the same defect that my own cases operated upon by his method had, and, together with other faults, caused me to abandon it.

My statement that the general surgeon has not as yet agreed upon anything like a uniform and satisfactory operation for cleft palate is true. The reason is easily explained and as one would expect.

A sufficient number of cases would hardly present themselves to any one general surgeon to give him much experience in this line of operations. Inexperience lends itself to faulty technic. Faulty technic results in failure. Failure to succeed with one operation tends to turn the operator's mind to another, and in this way he does not perfect himself in any. The natural and certain difficulties of working within the mouth, especially the mouth of an infant a few days old, are enough to test the skill and patience of anyone, without the added perplexities of a complicated method. For that reason simplicity is desirable. Although it is difficult to carry a plan of all the different flaps of the Lane operation in one's mind, the method of performing the operation is simple, and the instruments and needles used are those commonly employed by surgeons in other work. Its principles are surgical and easily understood. For the past nine years I have used Lane's operation in every case, and although designed by him for and more suited to be used upon infants during the first few days or months after birth, I have operated at all ages from four days, the youngest case, to sixteen years, the oldest one. The average as to age I should say to be about four months.

In any operation for cleft palate the operator should strive to obtain free nasal passages, to have open and equal nasal orifices, a symmetrical face, a low arched hard palate, and a full length and flexible soft palate. It is not enough simply to close the cleft and repair the lip. To attain these results an early operation is absolutely necessary, no matter whether the Lane or Brophy method are utilized. Brophy's operation does not get the low flat roof to the mouth which is necessary to free nasal passages, and the soft palate needs to be repaired later by some flap operation, even when his method is used on the hard palate.

The most important reason for an early operation in these cases, one which I have not seen mentioned elsewhere, is the large number that die before they reach the age when they would be ready for operation by the older methods. My experience leads me to believe that fifty or sixty per cent die of inanition within the first six or eight months of infancy, if the cleft is not closed by some method. The mortality from early operation by the older surgeons was so great that they were forced to abandon it. In contradistinction, Lane and Brophy did not have any large per cent of deaths from their work, and in my own series of cases by their methods I have not yet had a single fatality.

If from fifty to sixty per cent of these unfortunates die of starvation if unoperated upon, an occasional failure from operation itself ought not to discourage the operator. The sooner after birth the operation is performed the less the hemorrhage, while the shock to the nervous system will be very slight. The digestion, which is normal at birth, easily becomes impaired by the necessary means of feeding.

The muscles of the throat after the early operation begin their activity at once and do not have time to atrophy. This atrophy takes place where operation is delayed, and the eustachian tube suffers from this disuse of the muscles. The early formation of a fibrous band between the edges of the cleft by contraction begin at once to mould the twisted face into its proper position. Before the teeth erupt an opportunity is offered to get a wider flap by extending the incision outside of the alveolus. The immediate repair of the lip adds another factor in restoring the palatal processes to their normal place.

The description of the Lane operation, which I am about to present, shows the one that I have done for many years. It tells how I do it, and is not an attempt to improve upon Lane's description or operation. I shall not describe any of his special flaps or designs for unusual cases. No one with a thorough understanding of the method that I hope to explain will have any trouble in mastering special details, which are fully described elsewhere.

Sir W. Arbuthnot Lane, London, has given to the world three great surgical discoveries, viz.: His method of treating fractures, his work on the large intestine, and his operation for cleft palate. In two monographs, published by the Medical Publishing Company, London, one in 1905, the other in 1908, he clearly and fully describes his operation and gives the reasons for its being. The illustrations and drawings make the text easily understood, and a description of the flaps, adapted to every degree and variety of deformity, are included in the article.

A few years ago I made a special visit to London to study firsthand Lane's work. He was kind enough to give me all the attention necessary for a thorough understanding of his operation and make clear certain points that seemed obscure to me. Since that visit I have used his operation with increasing confidence in its value. From that time I have watched the journals and textbooks, expecting that someone with more experience and greater attainments than I have would bring to the attention of the profession, particularly our special branch of it, the unusual merit of this addition to our surgery. Some recent publications have not only failed to do this, but have shown such lack of understanding of the principles of the operation, that I hope in part to counteract their bad influence.

The operation is designed to bridge over the cleft by means of mucoperiosteal flaps from the bony palate in front, and the mucous membrane and submucous tissue from the muscular or soft palate behind. Flaps properly formed, when placed in position over the cleft, present their raw surfaces together, one overlapping the other. Fine silk sutures are used, and when tied they unite in this way the flaps and form a new, strong and complete palate. Not infrequently, even at birth, the free border of the septum will be found ulcerated. This ulcer is very slow to heal under ordinary treatment. To hasten the healing I have curetted the ulcerated surface and dissected the mucous membrane up on both sides of the septum until material enough is obtained for a flap, which is pulled down and sutured over the free edge of the curetted septum. By this simple operation tedious waiting is avoided. It is never safe to operate while the ulcer is present. For some time I have thought that it would be wiser to divide the operation into two sittings. This is particularly true where the cleft is a very wide one. In this way one could take better advantage of the blood supply. I have heard that Lane has recently adopted this plan in his operations, but have not the information directly from him.

Before beginning this dissection, a very careful study of the palatal processes should be made and advantage taken of the wider one to be used for the flap to be reflected. If the septum be continuous with the palatal process on one side, the mucous membrane of the septum may be elevated with that of the process itself and used as part of the elevated flap. It has substance enough for the elevated flap, but not enough for the one to be reflected.

OPERATION.

Outline the flap to be reflected, with an incision beginning at the anterior part of the cleft (a), extend it to the outside of the alveolus (b), cutting backward to the posterior end of the process (c), where there is a dimpling of the tissue. From this point (c), by means of sharp scissors, extend the outline along the groove (d), formed by the cheek and palate, to the posterior and outer free edge of the soft palate (e). Put the palate on the stretch by grasping the uvula (g), and continue the incision inward along the posterior free border of the palate (f) to the edge of the cleft (g). Include the uvula (g) in this incision. After the flap is outlined, raise the mucous membrane and periosteum over the alveolus and hard palate to the edge of the cleft (h, h, h), leaving enough normal tissue at the edge to nourish the flap.

It is best to use the knife in raising the tissue from the alveolus (i, i, i) and the periosteal elevator for the palate (h, h, h). The flap of mucous membrane and submucous tissue (c, d, e, f, g) is then separated and reflected with the one from the hard palate (a, b, c, d, e, f, g). Scissors would better be used to lift the tissue at the dimpling point (c). When the posterior palatine vessels (P) are reached in the dissection, it is important not to cut them, but by careful manipulation they may be dislodged and stretched and turned over with the other tissue of the flap. The saving of these vessels is very important, and may decide the results of the operation. On the opposite side the anterior portion is first elevated, then rotated, while the posterior part is simply elevated to receive the raw surface of the reflected flap beneath it.

For the second flap, begin the incision in front, at the edge of the cleft (2 to 3), and peel the periosteum up from the bone (1) as far back as the junction of hard and soft palate (6). From the point of beginning (1) incise the mucous membrane and periosteum outward and forward over the alveolus to the point just outside of the middle line (3). The incision is then turned backward, outside of the process (4, 4, 4), to include as much of the process as may be necessary to cover the cleft when the flap is rotated inward. This whole area (6, 1, 2, 3, 4, 4, 4) is thus converted into one large mucoperiosteal flap, with the palatal vessels (P) at its base for a blood supply.

The remainder of the flap on this side is formed by grasping the uvula (5) with a mouse toothed forceps, or by first putting a fine silk suture through the uvula and turning it with the rest of the soft palate into the mouth, thus exposing its upper surface. With the soft palate held in this flexed position an incision is made through the mucous membrane and submucous tissue, along the summit of this bent-over area (6, 7), to the outer and posterior border of the soft palate (7) near the anterior pillar of the pharynx. The incision is then turned at right angles and extended along the free border of the soft palate to the uvula (5). The flap outlined by these two incisions, when completed by raising the mucous membrane and submucous tissue from the underlying muscles, is fan-shaped (6, 8, 5, 7) and doubles the width of the otherwise narrow palate, and makes a raw area on the nasal surface to cover a similar area of raw surface of the first or opposite reflected flap.

The two segments of this flap, one (6, 1, 2, 3, 4, 4, 4) taken from the hard palate, the other segment (6, 7, 5, 8) taken from the soft palate, are then joined together into one large flap (3, 2, 1, 6, 8, 5, 7). This is accomplished by freeing the mucous membrane and submucous tissue from its attachments at the posterior edge of the palatal process (9, 9). The operation is completed by reflecting the flap (a, b, c, d, e, f, g) across the cleft and suturing it in place beneath the flap (3, 2, 1, 6, 8, 5, 7) with a double line of sutures (x, x, x, x, x, x, x). The greatest care should be used not to bruise or buttonhole these delicate structures.

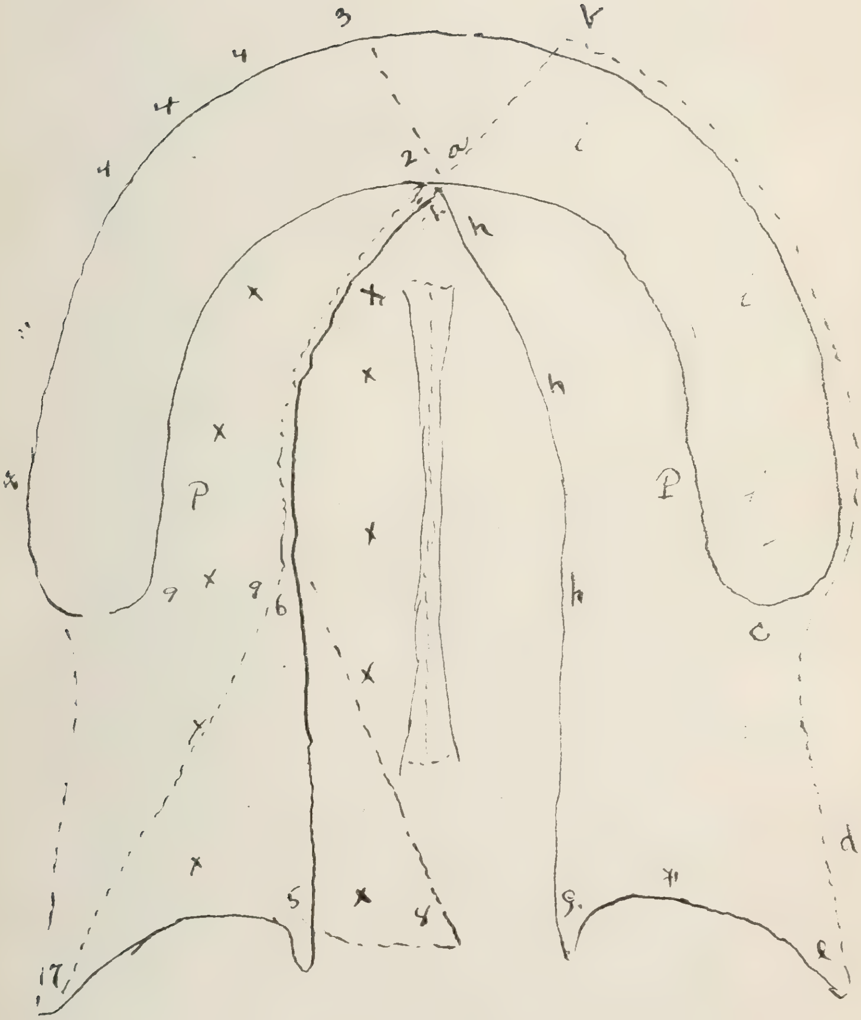
HARE LIP OPERATION.

I hesitate to report this operation as my own, knowing too well that it may have been done many times by other surgeons. If that be so, I gladly come forward and recommend it as a very satisfactory method of treating hare lip.

Operation.—The incision begins at the point of attachment of the lip to the alæ of the nose. It follows a line made by the junction of the mucous membrane and the skin (x x x, Figure 1) downward on both segments of the lip to point where it becomes normal in thickness (a a, Figure 1). Over this area the mucous membrane and all of the submucous tissue is dissected away from the muscles of the lip and turned backward into the mouth in one continuous, unbroken piece. The coronary artery is not injured, as the dissection does not include any of the muscle fibers, and therefore there is little or no loss of blood. The suturing begins on the mucous membrane at the upper part, and fine interrupted sutures of silk tied on the inner side of the lip unite it the full length of the new lip. (Figure 2.) The ends of the muscles—or, better, the muscular portions of the lip—are brought together and held in place by two or more mattress sutures of medium weight silk or linen. These sutures are introduced as follows: Both ends of the silk is threaded with a fine straight needle. Begin on one side, on the inner surface close to the alveolus, well back from the edge of the denuded surface, and carry the needle into the muscle straight for half its thickness, when it is turned sharply inwards, splitting the muscle in two parts; it comes out on the raw surface, is carried across to the other half of the lip, where it is again inserted into the muscles for a third of an inch and then brought out upon the skin surface. The needle on the other end of the same suture follows a similar course near its fellow. In this way a mattress suture (Figure 3) is formed that coapts the parts exactly. Skin sutures are seldom needed to hold the edges, but they may be inserted if there be any doubt about the edges remaining in position. Before the sutures are finally tied it is best to draw the lip into position to see if the original incisions are the proper length. If one or both sides are too short, a little more dissection will correct it.

In the lip splitting operation there is no sacrifice of tissue, and the lip may be operated upon as many times as necessary until the desired effect is obtained.

In double hare lip the intermaxilla carries a section of the lip on its anterior surface. The edge of this part of the lip is treated in the same way as though it were one edge of a single hare lip, and both of the outer parts are brought forward and attached to it. The intermaxilla and the lip attached to it should never be sacrificed. In cases where it has been done the lip sinks in and a most unsightly deformity results. It frequently happens that some months after operation upon the lip and palate, the moulding of the bones of the face into better position gives an altogether different expression to the face from that which appeared at the time of the operation. All that needs to be done in these cases is to extend the primary incision, insert a suture or two, and the expression is restored. It is equally possible that the parts may fail to unite, as there is in some cases a tremendous strain upon the sutures holding them in apposition, but as there has been no sacrifice of tissue, the operation may be repeated as often as desired.



Outline of Operation.

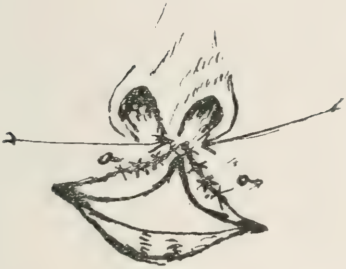


FIGURE 1.

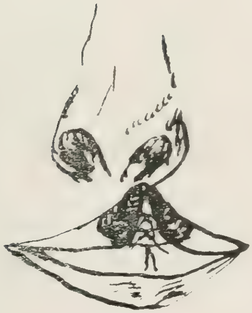


FIGURE 2.

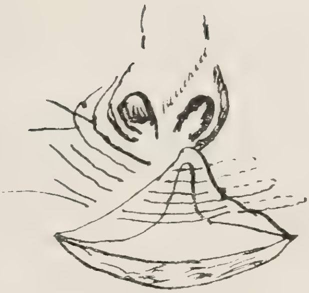


FIGURE 3.

LX.

CHRONIC PURULENT OTITIS MEDIA WITH SPECIAL REFERENCE TO TUBERCULOSIS.*

By Wendell C. Phillips, M. D.,

New York.

Modern observers in the field of otology have generally agreed that a considerable proportion of all cases of chronic purulent otitis media are tuberculous in character. The diagnosis of the tuberculous taint, however, has largely depended on clinical evidence alone, hence the statistics reported have been more or less biased by the individual opinions of the authors. Only in one class of victims has there been unanimity of opinion. This statement refers to cases in which the aural lesion occurs in conjunction with, and subsequent to, pulmonary or general tuberculosis. These are more common in adults.

Authors of textbooks on the ear almost without exception state that primary local tuberculosis of the middle ear is a rare affection. This has been my opinion until recent years, during which period I have bestowed more careful study on the large amount of clinical material which comes under my observation. Reasoning by exclusion, regarding the nature of the destructive lesions in the temporal bone and ossicles which are characteristic of persistent otorrhea, one is forced to conclude that some underlying dyscrasia must account for their failure to heal spontaneously, and tuberculosis furnishes the most reasonable explanation. Reasoning by analogy, comparing similar lesions in other parts of the bony framework, one is forced to the same conclusion.

On clinical evidence alone I have determined to my own satisfaction that primary local tuberculosis of the soft tissues, ossicles and bony walls of the middle ear is the determining factor in a large proportion of all persistent otorrheas, especially in young children. This conclusion is attended by one doubt. The clinical history in all cases seems to point to a more or less violent attack of acute purulent otitis media from the streptococcus or pneumococcus, or from exanthematous or other febrile diseases, and always with severe pain. Is it not possible that, after all, the tuberculous lesion is a later development on unresisting mediums? This query furnishes a basis for future investigation.

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*Read before the Section on Laryngology, Otology and Rhinology at the sixty-sixth annual session of the American Medical Association, San Francisco, June, 1915.

There is considerable evidence that bilateral lesions occur more frequently in tuberculosis cases, and that multiple perforations of the drum membrane are prone to be tuberculous.

The above remarks refer largely to local tuberculous lesions. The clinical history when the lesions occur as a late manifestation of general tuberculosis is quite distinctive. The onset is without pain and the course is rapid.

Every conscientious clinician welcomes any confirmatory laboratory evidence, and the purpose of this paper is to briefly outline the recent experimental work, some of which has already been published, which has been accomplished at the Manhattan Eye, Ear and Throat Hospital. It is believed that the problem of isolating the tubercle bacillus from chronic ear discharges has been overcome. In the *American Journal of Surgery*, July, 1914, Dr. J. G. Dwyer made the first report regarding the matrix bacteria and cytology of ear discharges, as follows:

A series of cases of otitis media purulenta chronica were taken and the aural discharge subjected to examination as to (1) the bacterial flora, (2) the cellular elements, and (3) the matrix. It was felt that simply examining the discharge for bacteria was quite inadequate, and that by so doing we were probably losing sight of other materials present in the discharge that may be of aid to us in the diagnosis. The present report deals with the work to date with the exception of an investigation as to the presence of bone salts in the discharge and the bearing of their presence on the lesion. The tubercle bacillus investigation is dealt with separately. Dwyer says:

"In our work on the bacteriology of chronic suppurative otitis, the technic employed was, with a few minor differences, the same as that used by Miss Gignoux and the writer in 1910, when employed on similar work on the tonsil. Smears of the discharge, taken in the way indicated by Dr. Haskin, were made on blood or ascitic fluid plates, after the manner of making streak plates, and were then incubated for twenty-four hours. The different colonies were then fished and stained films were made and the colony recovered on slant agar or in the case of the more fastidious organisms on the richer media, such as blood serum, ascitic agar, etc., and, if they proved to be organisms that were capable of identification morphologically, and were known to have any pathogenic power or even regarded as remotely having this, vaccines were prepared and used even before the final identification of the organisms. Direct smears were also made and stained by aqueous stains and by Gram stains, so as to serve as a check upon the plates. All organisms were studied on the various media and identified.

"In fifty-three cases we found the following organisms: staphylococcus pyogenes aureus, seventeen times; staphylococcus pyogenes albus and citreus, six; streptococcus mucosus, eight; streptococcus hemolyticus, eight; pseudodiphtheria (Hoffman's and xerosis), fifteen; pyocyaneus, sixteen; proteus, five; Klebs-Löffler, one; bacillus mucosus capsulatus, three. The bacillus subtilis and some other air organisms were repeatedly found, but were discarded. In many of the direct smears there were any number of spirochetes found, varying from that of Vincent to the refrigens and those found in the throat. It is my opinion that the true significance of the discharges from the middle ear will not be fully appreciated until an investigation is made of the rôle of these so-called innocent organisms from the throat, the torulæ, spirochetæ, etc., so often found in this class of cases and always discarded. An arbitrary division of bacteria into pathogenic and nonpathogenic varieties is attended with many difficulties in the case of the ear, since potentiality for serious mischief in this organ which so many reputed saphrophytes possess, render such a classification of doubtful expediency. There are perhaps few organs which present a greater variety of bacteria than does the ear, particularly in the chronic forms of disease of this organ. Thus with the above technic, organisms ordinarily looked upon as pathogenic, could be isolated in the big majority of cases, practically in ninety-five per cent. Some of these cases were of years' duration and in all cases over months, so that the bacterial flora as time went on might have changed considerably, but the fact that pathogenic organisms could so be isolated encouraged us to try the vaccines in these cases. No anaerobic cultures were made and no attempt was made to isolate the acid-fast organisms or by animal inoculations and agglutination experiments to differentiate the various strains of streptococci, as our primary object was to have a practical method of isolation and one that could be easily applied. No attempt was made to differentiate the bacillus butyricus or its allied groups.

"It is well known that in the chronic discharges we find very frequently acid-fast organisms that resemble the tubercle bacillus, which under rigid staining decolorize, and it is probable that these are strains of bacilli that have been acted upon by the bacillus butyricus, an organism found very often in the ear and which is nonpathogenic in itself, but when grown in symbiosis with other organisms change these latter so that they have different staining reactions, and if an organism can be changed in this respect, it is not a far step to assume that it can be changed in other more important respects, as is well known with other sets of organisms.

"With regard to the cellular elements, we think the study of these is well worth while. Under cytology, we may divide the cells into two groups: the epithelial and the mesoblastic. Epithelial cells are meatal, tympanic, or glandular. The commonest type is of course the squame, which in an healthy ear is absolutely confined to the meatus, but in chronic diseases invades the antrotympanic cavity and becomes one of the most striking features of the discharge. These squames fall into two classes—the old and the young. The old are acid-fast, have either no nucleus or the area where the nucleus should be is only a shadow. On the other hand, the young or recently formed squames have large oval or round nuclei, which readily take the stain, are not acid-fast and are easily decolorized. We of course have all grades in between these two extremes. This point may not seem of much importance, but this acid-fast property of old nonnucleated squames affords not only presumptive evidence of a cholestematous mass involving the antrotympanic cavity, assuming, of course, that the specimen was taken from the tympanum and not from the meatus, but fragments may be mistaken for the tubercle bacillus. The normal tympanic epithelium is seen only in the early acute stage of infection; such epithelium does not occur in chronic discharges, the tympanic lining having been transformed into the squamous or epidermal type.

"We next consider the mesoblastic cells, and these may be divided into the wandering and the fixed cells. The wandering cells are very important. They comprise the leucocytes, the lymphocytes and the plasma cells The leucocytes and lymphocytes are usually classed as pus cells, but inasmuch as they are unlike in function, structure and significance, some distinctions between them are necessary. The leucocyte of a recent or acute exudate is very sharply defined and the nucleus stains deeply, but degeneration soon sets in and we have well known series of changes which are indicative of the death of the cell. As the discharge becomes chronic, large mononuclear leucocytes become more numerous, in contrast with the very acute discharge, in which the polynuclear cells predominate. The lymphocyte is smaller than the leucocyte, with a slight amount of protoplasm, a large clear nucleus, and stains very deeply. The important thing is that in acute exudate changes about one lymphocyte can be counted to twenty or thirty leucocytes, but when the discharge comes from a granulation source the lymphocytes are strikingly increased, sometimes being equal in number to the leucocytes. Thus the presence and the proportion of these cells afford a reliable evidence of the existence of granulation tissue and the nature of the pusproducing process. They possess little, if any, phagocytic power. It must be remembered, however, that the proportion of lymphocytes in infants is much higher than in adults.

"The next class of cells are the fixed cells, and of these the epithelioid elements are those most frequently found. These cells are derived from the lining of blood and lymph channels and also from the perivascular spaces of the arterioles. They play an important part in the granulomatous formations, especially tuberculosis, etc. Although seen sometimes in acute inflammations, their presence in large numbers is characteristic in chronic discharge of tuberculosis.

"We thus see that an examination of the cellular elements may be a great aid to diagnosis and prognosis in a chronic purulent otitis.

"Not much need be said about the matrix, except that at times we can demonstrate the flat rhombic crystals of cholesterin and the fatty acids, characteristic of old desquamative changes in cholesteatoma.

"To sum up then shortly, the conditions responsible for chronic discharge from the middle ear are so varied that pathologic accuracy calls for some differentiation. As most frequently happens, granulation tissue is responsible for the pus. Evidence of this is afforded by the presence of leucocytes of all kinds, large, small mononuclear and polynuclear, normal and degenerated, but especially by lymphocytes which are very numerous, while epithelial cells are not uncommon. Bone disease may be marked by the presence of myelocytes or osteoblasts, or chemical analysis shows the presence of an increased amount of bone salts.

"Cholesteatoma is indicated by the presence of closely packed squames with or without bacteria, a distinction that may at first glance appear unnecessary, but is really of great importance, especially when the cells are of antral origin, for a septic cholesteatoma in that situation affords a stronger indication for radical measures than a nonseptic one—an interpretation amply supported by examination of antral contents removed at operation.

"Among chronic discharges we meet with is one which deserves special attention—it is very profuse, fetid, opaque, and like cream. On examination, it is found entirely free generally from cells, either epithelial or septic leucocytic, but consists of throat organisms in an albuminous matrix—not true pus, therefore, but a polymicrobic emulsion. With such a discharge, in which there are spiral and fusiform bacteria of many varieties and no cells, the existence of an active granulation surface can without doubt be excluded. Thus here, active aural measures to do away with the original infection are called for. It is the differentiation and identification of such a condition that will repay you in the knowledge gained. The throat organisms are such as spirochetæ fetidæ, bacillus fusiformis, leptothrix, etc. Also there are the organisms found in pyorrhea alveolaris, in tonsillitis, etc. In acute exacerbations, the influenza bacillus, micrococcus catarrhalis, etc., are found, but we did not find them in the uncomplicated chronic condition."

Coming more specifically to the presence of the tubercle bacillus in ear discharges the March, 1915, number of the *Laryngoscope* contains a preliminary report of this work by Drs. Cock and Dwyer. Dwyer, pathologist of the Manhattan Eye, Ear and Throat Hospital, has made use of Petroff's medium as the basis for growing the tubercle bacillus in the majority of the cases investigated in the above mentioned hospital. The preparation of Petroff's medium is as follows: Petroff found, after many trials, that a medium containing a whole egg, beef or preferably veal juice and gentian violet gave a uniformly positive result. This medium contains: Two parts of egg (white and yolk); one part of meat juice, and gentian violet sufficient to make the proportion 1:1000.

1. Meat Juice: Five hundred grams of beef or veal are infused into five hundred cubic centimeters of a fifteen per cent solution of glycerin in water; twenty-four hours later the meat is squeezed in a sterile meat press and collected in a sterile beaker.

2. Sterilize the shells of the eggs by immersing for ten minutes in seventy per cent alcohol or by pouring hot water on them. Break the eggs into a sterile beaker and after mixing them well, filter through sterile gauze. Add one part by volume of meat juice.

3. Add sufficient one per cent alcohol gentian violet to make a dilution of 1:1000, take about three cubic centimeters in each sterile tube and inspissate for three successive days; the first at 85° C. (185° F.) until all the medium is solidified, changing the places of the tubes if necessary; the second day and third day not more than one hour, at 75° C. (167° F.). For the bovine type omit the glycerin and infuse the meat twenty-four hours in water. Bovine tubercle bacilli grow in this medium even if it contains glycerin, but on account of popular belief and the above data a medium without glycerin was used.

From a very careful calculation it appears that if a single organism divides in two it will take approximately from six to seven days to grow to a pin point colony and be visible. To confirm this, organisms were isolated by Barber's method and inoculated in a test tube containing gentian violet-egg-meat juice medium and on the sixth day three pin point colonies were visible.

The strain of tubercle bacilli used in this experiment was well adapted to growth outside the body, having been isolated some two years ago. This experiment shows that under the most favorable conditions it will take at least six days for a single tubercle bacillus to grow to a visible colony.

An improvement on this medium has been devised by Dr. R. H. Miller, of Columbia University, who makes use of glands, lymph nodes, liver, etc., from laboratory animals, as the basis of his medium and thus supplies the tubercle bacillus with its own natural food. His work has not been published. The growth with this medium has been more rapid and apparently appears sooner after inoculation than with the original Petroff medium.

"Reviewing briefly the methods of diagnosis of aural tuberculosis, made use of in the past, we find that the main methods may be tabulated as follows: (1) the microscopic examination of tissue excised from the preotitic lymph glands; (2) the microscopic examination of tissue or granulations from the tympanic cavity; (3) the direct morphologic examination of the aural discharge, and (4) the passage of the discharge through laboratory animals—that is, the guinea pig. The first two methods cited require surgical measures and in the opinion of the majority of otologists these operative measures ought to be avoided, and, moreover, are not feasible in the most of our cases. The third method, that of direct morphologic staining, has been used by Cocks and Dwyer with great success as follows:

"The aural discharge was obtained in as large a bulk as possible in a small qauntity of normal saline solution. The water used in making up the salt solution was freshly distilled each day in order to be sure that none of the acid-fast organisms present in tap water or in old distilled water could vitiate our results. This discharge was then treated with an equal amount of 15 per cent antiformin and the whole allowed to stand for a varying period, depending on the consistency of the mixture, etc. It was then centrifugalized and the precipitate washed to remove the excess of alkali. Smears, made from the precipitate, were stained by Ziehl-Neilson and Pfaffenheimer's methods. In this way, by examining many smears, we were able to demonstrate the organism with reasonable certainty. By this method, however, no matter how much care is exercised, there is always an element of uncertainty in morphologic diagnosis alone, as in many of the old chronic suppurating ears the acid-fast epithelioid flakes are apt to be mistaken for tubercle bacilli. These flakes are present in a large proportion of chronic cases, as mentioned below. The fourth method, that of animal experimentation, has always been subject to difficulties and delays. In the first place, the inoculated guinea pig often dies from pyogenic infection; in the second place, one could never be sure that the guinea pig was free from tuberculosis before inoculation. Frequently the pig died from other causes. After the use of antiformin came into vogue, secondary infection of the animal was eliminated, because antiformin destroys all the common pyogenic organisms except the acid-fast group. At best, inoculation experiments require from four to eight weeks, during which valuable time is lost in the treatment of the patient, who frequently escapes from observation, especially if he happens to be ambulatory."

In view of the above difficulties and for the sake of early diagnosis and scientific accuracy, an investigation was made concerning the possibility of cultivating the organism directly from the aural discharge in pure culture, just as with any of the ordinary pyogenic organisms, thus eliminating animal inoculation, inaccuracy of diagnosis, and insuring early and exact diagnosis, so that treatment with tuberculin could be started earlier.

The technic of securing the specimens has been described by Dwyer as follows:

"After obtaining the aural discharge in wide mouthed bottles, it was immediately saturated with sodium chlorid and allowed to stand for from half an hour to an hour. At the end of this time, the bacteria are found floating on the surface. This floating film is then collected with a deflagration spoon in a wide mouth bottle, and an equal volume of normal sodium hydroxid added. The mixture is shaken well, and left for digestion in the incubator at 37° C., for one to two hours, or longer, care being taken to shake it every half hour. The mixture is then neutralized to sterile litmus paper with normal hydrochloric acid, and the sediment is inoculated into several test tubes. Growth usually occurs in from fifteen to thirty days."

At first no effort was made to differentiate the human and the bovine types, but this is being done with the present specimens. A brief synopsis of the histories follows. Up to date we have examined forty-four cases by the cultural method for tuberculosis, and obtained six positive cases. Three of these six cases were reported by Drs. Dwyer and Cocks in the *Laryngoscope.* The forty-four cases examined for tuberculosis were obtained as follows: Thirty-two were patients taken in the clinic where we were examining all cases of otitis media purulenta chronica in children for tuberculosis. The other twelve cases were from Seaton Hospital and other institutions and were mostly patients with tuberculosis in other parts of the body. Thus far, then, we have examined forty-four patients by culturing the pus from the auditory canal or mastoid wound and have obtained positive results in six cases, or 13.6 per cent. Of the positive cases Dr. Cocks reports in the above mentioned paper the following nine cases:

"Case 1.—Samuel S., aged fourteen years, was first seen on the operating table at the Manhattan Eye and Ear Hospital. He was in for adenoid and tonsil operation. On examination under ether, a small teratoma of the nasopharynx was found. His tonsils were small and buried. They were removed, and the teratoma was excised. At this time we were examining all children with chronic purulent otitis, for tubercle. Finding that this boy had chronic discharging ears, a culture was taken. The patient is undeveloped for his years, but otherwise healthy in appearance. He is a mouth breather due to right side septal deflection. A few small cervical glands are felt on both sides of the neck, in the posterior group. There is no periotitic glandular enlargement. His chest is pigeon shaped. Examination of the lungs is negative. A roentgenogram of the chest fails to show signs of tuberculosis. There is moderate purulent discharge from both ears. The left ear has a large, nonmarginal perforation. In the right ear there is a small central perforation. There is nothing suggestive of tuberculosis in either tympanic picture. Pus was washed from the ears into a single flask, and tubercle bacilli cultivated. Under cleansing treatment and instillations of alcohol, the discharge ceased in the right ear. The left side is still suppurating, though less profusely.

"Case 2.—Frank R., three years old, a patient of Dr. Fowler's in Dr. Phillips' clinic. An accurate history was not obtained from the mother, who was unable to speak English. The child has suffered from a bilateral purulent discharge for two years or more. He has never had any of the ordinary infectious diseases of childhood.

"Examination: Pus in both canals; left drum: oval perforation in front of malleus handle. Right drum: small round central perforation. No enlargement of periotitic or cervical glands was noted. He had adenoids and hypertrophied tonsils. Tubercle bacilli were cultivated from washings from ear.

"Case 3.—An Italian child, four years old, from Dr. Phillips' clinic. Two years ago the child had measles, chickenpox and pneumonia. For nine months he has had a purulent discharge from the right ear. On examination, the external auditory canal was found to be filled with a large polyp. Tubercle bacilli were cultivated by Petroff's method."

The following cases were examined by Dr. Dwyer by the antiformin method. The precipitate from the washings was stained for tubercle.

"Case 4.—Dr. Hubby's patient, in Dr. Phillips' clinic. Child one year old with no family history of tuberculosis. The apparently healthy child had an attack of acute otitis. One week later Dr. Hubby examined the patient and found mastoiditis and facial paralysis. Operation revealed a broken down mastoid, full of pus. Following the operation, the wound showed absolutely no attempt at repair, although the child looked healthy. Pus from the mastoid wound during a postoperative dressing revealed tubercle bacilli. About one month later the child ceased coming to the clinic, and is said to have died from meningitis, presumably tuberculous.

"Case 5.—Dr. H. B. Brown's patient. A young woman, aged twenty, suffering from pulmonary tuberculosis, was sent to the Manhattan Hospital for extreme swelling and edema over the mastoid. The cervical glands on the same side of the neck were markedly enlarged. Investigation showed furunculosis of the external auditory canal. After three injections with a staphylococcus vaccine, the furuncular obstruction disappeared, and it was possible to obtain pus from the suppurating middle ear. Smears showed tubercle bacilli. One month's treatment with tuberculin produced a cessation of the aural discharge and complete disappearance of the glandular enlargement.

"Case 6.—Mary M., seven months old, a patient of Dr. W. L. Culbert. Family history negative. Both parents and three other children are living and well. Five weeks before coming to the clinic the child had a purulent discharge from the right ear. Three weeks later, facial paralysis developed. The child had three operations: the first a simple mastoid operation, in March, 1914; the second, for suppuration of the parotid gland; and the third, for removal of enlarged cervical glands. The mastoid wound healed very sluggishly. Pus taken at the time the wound was dressed revealed tubercle bacilli. Dr. Culbert has given the patient tuberculin injections. At present the child is in fine physical condition. The ear, however, still has a slight discharge, and there is a small retroauricular fistula which is almost dry.

"Case 7.—Dr. Haskin's case. J. R., a colored man, aged twenty-nine years, with chronic purulent otitis media. Typical tuberculosis of the ear. Small particles of bone could be picked away. Antiformin method and stained smears showed tubercle bacilli. This patient had tuberculosis of the lungs and was referred to the Otisville Sanitarium.

"Case 8.—Dr. Haskin's case. McG., aged thirty-two years. Onset of suppurative otitis media, without pain and with rapid destruction of drum. The patient's physical appearance was excellent. He has a history of having had a rectal fistula.

"Case 9.—Dr. Dwyer's case, a baby, eighteen months old, whom he operated on for a subperiosteal abscess. There was a sequestrum involving the entire mastoid process. Smears from the pus showed tubercle bacilli. In this case there was a positive von Pirquet reaction. Death ensued from tubercular meningitis.

"Case 10.—M. T., aged five years, came to my clinic November 24, 1914. Patient has had a discharge from the left ear off and on since she had scarlet fever three years ago. Adenoids and tonsils were removed two months before. For the past three months the left ear has been discharging almost constantly. Mucopus not affected by the adenoid and tonsil operation. Dr. Phillips plans to do a radical operation unless patient is improved by a couple of weeks' treatment. The parents are well. One other child is healthy. Specimens of ear discharge were examined for tubercle bacilli and found positive.

"Case 11.—T. F., five years old. Treated in my service by Dr. Sharp. Otitis media purulenta chronica (left) has existed for two and a half years. There is a constant discharge which started with pertussis and earache. Three other children are all healthy. Patient has adenoids and enlarged tonsils. Referred for adenoid and tonsil operation. Left ear has a small nonmarginal perforation from which a drop of pus oozes. Culture positive.

"Case 12.—H. R., three years old, a patient of Dr. Cocks on the throat service. One and a half years before, patient fell and received traumatism at inner side of eye over lower part of forehead. When first seen patient had a skin fistula at this point communicating with the ethmoid cells. An external radical operation on the ethmoid was performed by Dr. Cocks, and the wound was closed. It has remained dry for one year. While in hospital the patient had a foul discharge from one ear, which was chronic. With probe in the canal I found a defect in the posterior canal wall. Knowing that I was dealing with a case of otitis media purulenta chronica with necrosis of the canal wall, I exposed the mastoid and performed a radical operation. The wound healed and ear became dry. In the past year there has been occasionally some secretion from the middle ear for a few weeks at a time, then the ear heals again and remains dry. The culture was positive.

LXI.

VERTIGO OF LABYRINTHINE ORIGIN FOLLOWING A CHRONIC SUPPURATIVE OTITIS MEDIA WITH CHOLESTEATOMA.*

1st—Simple Mastoid With Curettage of the Middle Ear and Eustachian Tube.

2nd—Radical Labyrinth Exenteration.

By Francis P. Emerson, M. D.,

Boston.

The labyrinth, whether functionally disturbed or the seat of pathologic changes, has held in the immediate past and still continues to hold front rank in the interest of otologists. We are indebted particularly to the Vienna school for a classification of its diseases which is of great value in didactic teaching and as a pathologic grouping of its disorders. This must of necessity apply largely to typical cases. The otologist is more anxious about those cases less sharply defined clinically—cases which, in their final analysis, confirmed by operation, may be readily labeled pathologically, and yet in their clinical manifestations have presented a reasonable doubt as to the surgeon's attitude in regard to immediate operative interference. The relation of the vestibular apparatus to the brain demands an exact diagnosis and immediate surgical intervention in all pyogenic invasions of the labyrinth, if we are to save life. Under the above conditions the mortality rate is encouraging. The case outlined below is offered as one with delayed symptoms, and one which was perhaps less clear clinically than many.

The following history, taken from the records of the Massachusetts Charitable Eye and Ear Infirmary, occurred during the service of Dr. Crockett and Dr. Mosher, August 11, 1913:

J. L., American; occupation, florist; age, sixty-two years. Diagnosis, right ear, otitis media suppurativa chronica.

History.—The right ear had its onset with loss of hearing nearly thirty-five years ago, and was followed by ringing in the ears for thirty years. His present attack commenced about five weeks ago with moderate pain. Three weeks ago he had dizziness on movement, especially of the head forward and backward. The patient awoke at night with dizziness; vomiting and nausea were associated with the dizzy attack. Once, about a week ago, the patient had an attack of vertigo on stooping to lace his shoe. Failing of vision was noticeable, especially in the left eye, since injury and incision of the left part of the forehead years ago. There were no true chills, and no true headaches. He had pneumonia for three days (?) twelve years ago. The patient denies any discharge from the ear.

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*Read before the American Laryngological, Rhinological and Otological Society at Chicago, June 16, 1915.

Left ear.—Slight deafness after slight pain and discharge for a brief period subsequent to la grippe four years ago. No night sweats; measles at fourteen years of age; tobacco, chews and smokes slightly; alcohol, very slight; venereal disease denied; two miscarriages by wife on second and third pregnancies; first and fourth children alive and well.

Physical examination.—Heart, left border three-fourths millimeter outside nipple line, otherwise all right. Urine negative.

Local.—Right ear: Slight preauricular, posterior and auricular tenderness. Canal near annulus is slightly reddened. Membrana tympani is absent; no ossicles are visible; granulations in posterior quadrant of middle ear; no bare bone felt on probing; cholesteatoma present; no mastoid tenderness or edema.

Left ear: Effusive otitis media suppurativa. Membrana tympani thickened, retracted and moderately calcified. The nose has a large cartilage perforation with history of trauma. Nasopharynx, etc., negative; right inguinal hernia in canal only, the size or an egg. Glands, epitrochlear and posterior cervical present. Hearing test.—

R		L
0	W	1/35
	V	
0	AC25″	6
—	F 512 v. s. ———	—
3	BC12″	3
	Weber < F 256 v. s.	
2.5	Limits Galton	N
0 v. s.	Low	v. s. .64

August 12.—Operation under ether by Dr. Emerson.

Right ear: Usual (slightly long) mastoid incision; sinus exposed on removal of the first piece of cortex. Area of dura uncovered the size of a bean. This area was just over the antrum; more dura exposed, the cortex being paper thin, and the dura was probably that over the cerebrum rather than that over the sinus. There was a dehiscence in the superior wall of the canal anteriorly, so that the dura could be felt. The dura exposed over the attic and aditus, middle ear cleaned out, eustachian tube curetted; eight silkworm gut sutures to the mastoid wound; slight twitching of facial nerve on probing the middle ear; bridge just broken through; wick to middle ear and canal; dry dressing, pads and bandage.

August 17th.—Discharge from the middle ear is moderate; posterior auricular wound looks all right.

August 22nd.—Mastoid wound almost completely healed, middle ear moderately moist.

August 30th.—Wound completely healed, middle ear slightly moist. Patient has no dizziness on bending head back.

September 4th.—Middle ear slightly moist; wound healed.

September 8th.—Middle ear slightly moist.

September 10th.—Discharged, relieved, to out patient department. Hearing test.—

R		L
0	W	6/12/35
	V	
0	AC25″	6
—	F 512 v. s. ———	—
3	BC12″	3
	Weber < F 256 v. s.	
0	Limits Galton	N
0 v. s.	Low	v. s. .96

Reentry November 11, 1913.—The previous operation relieved the symptoms until about one week after leaving the hospital, now about eleven weeks ago. Then the patient began to have dizziness and a sensation of whirling to the right on turning the head backwards, and to the right or backward, worse when lying down, noticeable on rolling over on the right side. Patient has fallen in the street five or six times in the past few weeks. He does not lose consciousness, and has had no nausea or vomiting in recent attacks, save twice, which he attributed to a sour salad.

Physical examination.—Negative, save loss of convergence of the left eye, in which the sight has been poor for more than forty years, following an injury in the left frontal region. No nystagmus; fistula and caloric tests negative. On turning, symptoms of irritation when one of the vertical canals are in the plane of rotation. Healed mastoid incision, slight depression.

November 12th.—Dizzy spell; the patient came near falling from turning the head suddenly.

November 19th.—Fell to right side while coming out of the toilet into the hall, and fell forward after reaching a chair on attempting to rise.

November 28th.—Patient had a dizzy spell last night and fell.

December 4th.—Had a dizzy spell and fell at bedside at 11 a. m.

December 26th.—Had a dizzy spell and fell to the floor at 7:30 a. m.

December 30th.—Fell during early morning. While in bed the patient holds on to the iron rods of the head of the bed with both hands to prevent being lifted up and dropping out of the window. This sensation of rising toward the ceiling was very strong and constantly present, although his sensorium was clear.

January 9th.—Right labyrinth exenteration under ether, by Dr. Emerson. An incision was made through the old scar, which was very faint. There was free bleeding from the dura on freeing the soft parts, which was controlled by a plug. The mastoid area was very narrow. The bridge was taken down, which exposed the dura of the tegmen tympani and reached within one-fourth inch of the facial canal in the middle ear. Here the facial nerve was large and was exposed, and the sinus was bared posteriorly and the labyrinth approached from this, after the manner of Neuman. The horizontal canal was entered first. The space between the horizontal canal and the dura posteriorly was very narrow. The vestibule was entered through the solid angle and the superior and posterior canals followed out from the vestibule. The horizontal canal was clear, the posterior and the superior niches were demonstrated. The facial nerve lay down on the promontory and oval window so far as to make probing of the oval window dangerous. A flap in the canal was cut superiorly and posteriorly, letting the flap fall down and backward. A light middle ear pack, a wick to the vestibule, a light cavity pack of iodoform gauze, silk worm gut sutures, dry dressing and bandage were used. (When the operation was complete the whole of the inner mastoid wall and tegmen, and the posterior surface of the petrous portion of the temporal bone down to the inner limit of the canals were removed. The superior and posterior canals lay so close to the surface that they could not be dissected with removal of the labyrinth shell.)

January 10th.—Rotatory nystagmus to left, patient very comfortable.

January 11th.—A moderate amount of clear discharge came from the cavity, of cerebrospinal fluid. (?)

January 15th.—Patient complains of a slight headache. The packing was removed and the cavity found clean. Repacked lightly with iodoform gauze.

January 16th.—Packing changed, patient feels well, bandage discontinued.

January 17th.—Packing changed, cavity clean.

January 19th.—A small wick was put in labyrinth cavity, outer cavity free.

January 24th.—Granulations not very active, cavity clean, discharge slight.

January 29th.—Discharge slight, dura cleaning.

February 8th.—Discharge very slight, epidermis spreading fast.

February 12th.—Labyrinth space filling in with granulations.

February 19th.—Labyrinth about closed in, granulations not overactive, middle ear cavity narrowed by granulations over facial, but epidermatized. Feels well. Discharged, relieved, to out patient department.

Urine negative. Nasopharynx, large perforation of the septum—traumatic. Wassermann reaction negative. (Blood test.)

Summary.—Previous to operation we have a man prematurely old. There is a perforation of the septum. His wife has had two miscarriages. The hearing test for his good ear—that is, the left—the writer has found to be strongly suggestive in other cases of lues—i. e., a low note, but little, if any, raised; a positive Rinné with marked lowering of bone conduction, and the whispered voice reduced to one-twenty-fifth or one-thirty-fifth. In this case there was a negative Wassermann, but no examination was made of the cerebrospinal fluid. His eyes and a physical examination did not give evidence of specific disease. Could lues then be eliminated as a direct or contributory factor in this patient's symptoms?

Second.—The right ear gave a history of discharge for thirty years, and in addition we have a cholesteatoma, which, as we know, is quite apt to invade the labyrinth. There were granulations in the posterior quadrant. The hearing test, done several times, always showed vestibular irritation when the vertical canals were in the plane of rotation. Unfortunately the difference in the after-nystagmus between the turning to the right or to the left was not recorded. The fistula and caloric tests were negative, and there was no nystagmus. The hearing test, done by two different observers, showed total deafness for the right ear, except a bone conduction of three inches. Can we say that this then was a case of diffuse purulent latent labyrinthitis, and that the apparent vestibular reaction was compensatory? According to Ruttin, this does not occur unless a latent purulent labyrinthitis has existed for a long time and has been followed by a complete ossification of the labyrinth or sequestration. In this case there was no clinical history of vertigo until five weeks before admission, and our operative findings showed the horizontal canal free, while the superior and posterior contained a grayish red, granular, nonadherent detritus. There was no organized tissue or evidence of ossification present. The second day after operation we have a clear serous discharge resembling cerebrospinal fluid. There was no facial paralysis and no sequestrum was found. On the other hand, the turning test was always positive.

Third.—Have we any evidence to suggest that this was a case of diffuse serous secondary labyrinthitis? The onset of the vertigo favors this supposition, and is confirmed by the hearing test, which shows a remnant of vestibular irritation present. The operative findings are also consistent with this diagnosis. On the other hand, the caloric and fistula tests were negative, and there was no nystagmus at the time the patient was examined. The caloric reaction we know may be lost. If we assume that the portal of entry was originally by way of the oval window, could we not explain the failure at this time to obtain a positive fistula test by the presence of granulations in the posterior quadrant of the middle ear? We recognize that such an invasion is more often followed by a purulent labyrinthitis, but three cases out of fifty reported by Ruttin were followed by the serous form. There remains then to be accounted for the absence of nystagmus. This is a symptom of irritation, and if of the second degree it might readily have been wanting at the time of observation. In the light of our symptomatology and the operative findings, the writer is inclined to consider the case one of a diffuse serous secondary labyrinthitis as affording the only consistent diagnosis. For those who accept this interpretation the division into two stages of the operative procedure is perfectly consistent. If this diagnosis is accepted we must assume that there were no well defined symptoms immediately following the mastoid operation, but that, if present at all, they were but little marked, and only developed as a pronounced diffuse serous secondary labyrinthitis on the sixth or seventh day.

LXII.

THE USE OF QUININ AND UREA HYDROCHLORID AS A LOCAL ANESTHETIC IN ONE HUNDRED AND FORTY-EIGHT CASES OF TONSILLECTOMY.

By Louis J. Burns, M. D.,

Philadelphia.

In considering the use of the double salt of quinin and urea hydrochlorid as a local anesthetic in the operation of tonsillectomy, I shall endeavor to confine myself to such advantages which it seems to possess over other anesthetic agents, such as cocain, novocain, etc., now in use by the laryngologist, namely, mode of action, duration of anesthesia, method of application, and primary and secondary hemorrhage, eliminating entirely discussion of the various operative technic now in use, it being influenced apparently in no way by any other technic than that in which it was employed.

Before considering its application directly, a short résumé of quinin and its various combinations, and its early use as an anesthetic, may give a better insight to its various fields of usefulness as a local anesthetic.

The first use of quinin and urea as an anesthetic was called to our attention September, 1907, by Dr. Henry Thibault, Scots, Arkansas, he first having employed one to two per cent solution in general surgical procedure, such as incising of furuncles, carbuncles, removal of cysts, etc.

Ten to twenty per cent solutions were also used to the mucous membrane in pharyngitis, tonsillitis and in rectal conditions. Although Thibault first called attention to the action of the double salt of quinin and urea, the action of quinin itself had been generally observed in our Southern states, where large amounts of quinin sulphat have been used hypodermically, that the injected and surrounding areas remained anesthetic for a long time afterwards, thus facilitating the use of the injected areas for further injections.

August, 1908, Dr. Edward J. Brown, Minneapolis, suggested the use of quinin alone, after first painting the tonsil and surrounding tissues with holocain, and following this with an injection of three per cent solution of quinin hydrochlorid with adrenalin.

This method has proven unsatisfactory, as the rapid hemostatic action of adrenalin precluded the production of sufficient action of the quinin to produce the necessary anesthesia. This was likewise proven a rather dangerous procedure, inasmuch as there was the ever-present danger of secondary hemorrhage following the relaxaton of the blood vessel walls upon the subsiding of the hemostatic action of the adrenalin.

October, 1909, Dr. Arthur E. Hertzler, University of Kansas, suggested the use of quinin and urea hydrochlorid as a local anesthetic in surgical operations such as hernia, tumors and rectal operations.

Parsons of London experimented with its use in cases of uterine prolapse, by producing marked infiltration, but later abandoned its use, finding it impossible to properly gauge the amount of infiltration its use in softer structures would produce, it having a tendency to overdistend the more pliable abdominal and perineal tissues.

As to the strength and amount of solution, and time necessary to produce anesthesia: These were points in its use which only a great number of cases were able to satisfactorily demonstrate. About three minims at each of our five points of injection are usually sufficient, more than this amount causing an overdistention in our field of operation.

As to the strength of solution: The stronger solutions to ten per cent were first employed, but finally abandoned, it being found that an excess of exudate was produced, which condition interfered with our operative technic, later causing very uncomfortable symptoms, such as pronounced swelling and a very disagreeable fullness of the injected and surrounding areas.

One-half of one per cent solution was also used, but this failed to produce anesthesia, as likewise the necessary infiltration to prevent pronounced primary or the occurrence of secondary hemorrhage, which feature is one of the greatest advantages of its use.

Two per cent solution was finally selected as the strength best suited for use, giving pronounced anesthesia and sufficient infiltration as a postoperative precaution against secondary hemorrhage and pain, at the same time not interfering in any way with our operative technic, or separating the tonsillar capsule from its attachments, or later application of the snare, if such instrument is employed.

The quantity of solution necessary is of great importance; in fact, its whole success depends on the use of only a sufficient amount to cause a pronounced infiltration without an overdistention of the surrounding areas. Thirty to forty minims are usually sufficient, for inasmuch as it requires five to six minutes for our infiltration to reach a sufficient degree to produce marked anesthesia, we can very readily understand that by the time our anesthetic has taken effect, our field of operation will be so distended that our operative technic will be greatly interfered with. It is, therefore, advisable to avoid an excessive amount.

As to the point of application and technic of injection: Four to five points on either side are sufficient. Low down on the anterior pillar, one about midway between that and the supratonsillar fossa, one at the fossa and two in the posterior pillar. Extreme care should be used not to overdistend our posterior pillar, as an excess of infiltration may cause a considerable amount of discomfort by later on forcing its way into the loose tissues of the soft palate, or into the uvula itself, or downward to the glottis, producing a feeling of distention or fullness in swallowing or attempt at speaking.

About three minims to each point of injection is all that is ordinarily required; and as it is not an uncommon thing for the point of our needle to penetrate through both surfaces of the tonsillar pillar, instead of merely restricting itself to the confines of the adjacent pillar walls, it is advisable to fill our syringe to avoid the necessity of stopping to refill. But inasmuch as our drug is absolutely nontoxic, no alarming symptoms are caused if any is accidentally swallowed, although this seldom occurs, as our patients very promptly appeal to us to permit them to expectorate, due to the pronounced bitter quinin taste.

A point in the technic of our injection to be carefully observed is our tendency to insert the second injection before we have waited until we have noticed the extent of the previous one, as a looseness of the tissue in the injected area is an index to the point for our next injection, infiltration sometimes extending for over one inch from as much as five minims of fluid.

It is best, therefore, to wait for the previous injection to reach its maximum of infiltration before repeating our next. This should be especially observed in our injection downward or upward in the posterior pillars.

Of its mode of action: Early experiments first led to the belief that the edema and thickening produced in the injected areas was due to cellular infiltration. This was later proven to be not a cellular but a pure fibrinous induration, free from cells, proving that the induration is purely a chemic change.

As to the degree of anesthesia produced: The incised tissues are completely anesthetized, no pain being produced by such operative procedures as pulling the tonsil forward from its attachment or in the separation of adhesions low down. The latter might be avoided were it not for the disagreeable effect produced by the infiltration if injected too near the base of the tongue.

Of the time necessary to produce anesthesia: It is found to be present within three or four minutes after injection, at which time it seems most desirable to operate, delay not being advisable beyond ten minutes.

Considering duration of anesthesia: It usually lasts five to seven hours, gradually subsiding for a period of three or four days. This feature is one of its greatest advantages, obviating, as it does, many of the disagreeable postoperative symptoms so common in tonsillectomy. The only annoying feeling at any moment produced is a fullness on swallowing, with occasional pains radiating to the region of the ears. This feeling of fullness is produced by infiltration of the quinin and urea. In many cases marked distention of the uvula takes place, this edema being caused by the infiltration producing a mechanic obstruction to the circulation in this region.

As to the technic of application: The only instruments necessary are an ordinary hypodermic syringe with the addition of an extra barrel about three inches long, which screws on the same thread as an ordinary hypo needle, this being necessary to give us additional length needed to reach our field of injection, namely, the anterior and posterior pillars. At the distal end of the additional barrel is screwed on an especially constructed reinforced needle with a partly flexible barrel extending up to the steel point of the needle proper, which is curved to permit of its insertion into the folds of the anterior and posterior pillars. This needle is further protected by a small shoulder at the junction of the needle proper and the partly flexible barrel, to prevent its sudden plunging into deeper structures than the pillars and the tonsil structure itself. Or an all metal syringe, such as used in the more recent cases, with three ring attachments, to enable us to more readily control our technic in injecting.

Up to the present time I have used it in one hundred and forty-eight cases of tonsillectomy, irrespective of the condition of the tonsils, whether characterized by marked adhesions, freely detached or diseased. In other words, I have depended entirely upon its use as a local anesthetic in tonsillectomy where local anesthesia might be employed; it of course being applicable only to such cases as we would ordinarily select for local anesthesia.

In fact, its use has proven applicable to very many cases in which we would refrain from the use of cocain, either locally or by injection, in sufficient strength to give us either an equivalent or necessary anesthesia. Its absolute nontoxic action permits its indiscriminate use in the neurotic or chlorotic individual, so often the subject of tonsillectomy. I have not encountered a single case of the ever-prevalent and disagreeable phenomena which heretofore have been some of the few drawbacks with which the laryngologist has been compelled to deal, where cocain and such other toxic anesthetics have been employed.

Observations taken in one hundred and twenty cases fail to show any marked changes in either the force or frequency of the pulse before, during or after operation. Never at any time has any case shown any of the ever-prevalent symptoms of collapse or the socalled fainting which has always heretofore been one of the objectionable features of tonsillectomy where local anesthetics such as cocain, etc., have been used; eliminating, of course, the temporary excitement which might occur, due to our operative technic, etc.

Fifty-nine cases out of a total of one hundred and forty-eight were inmates of the Pennsylvania Training School for

Feeble Minded and Epileptic, its use at this institution being limited, however, to only the higher grade inmates. This class of cases furnished us with a strong index of its value, inasmuch as patients of this type are difficult to thoroughly anesthetize, and likewise very prone to profuse primary and secondary hemorrhage. They also have a tendency to the idiosyncrasies of cocain, eucain, and their derivatives, being strongly inclined to collapse with even the use of the weaker solutions.

One patient, a young woman, twenty-eight years of age, with a history of profuse postpartum hemorrhage at the birth of each of her four children, in whom had occurred severe hemorrhage on previous operations for nasal polypi and sinus disease, was operated upon for tonsillectomy. She stated she suffered from no pain, and she experienced no primary or secondary hemorrhage. This was one case in which I hesitated for some time to administer a general anesthetic or any other local application or injection until quinin and urea had finally convinced me of its perfect safety. This case was demonstrated before the Laryngological Section of the College of Physicians of Philadelphia, three and one-half hours after operation, she up to that time and afterwards having experienced no unpleasant symptoms or secondary hemorrhage, though she was compelled to travel the distance of three miles to and from the place of meeting. Adrenalin chlorid in one to one-thousand solution had little or no effect in her previous nasal operations. Packing snugly applied was always necessary.

Another very noticeable advantage, and probably one of its pronounced ones, is the absence of hemorrhage, either primary or secondary; but one case of primary hemorrhage occurred, and that in a young man of eighteen years of age, whom it was afterwards found had a low coagulation. This hemorrhage was very readily controlled by pressure, the patient returning to his home unassisted in about one hour's time, having no further trouble. No case of secondary hemorrhage occurred.

This lack of hemorrhage is due to the action of the injection, producing a fibrinous induration in the tissue surrounding the blood vessel different from the action of cocain and adrenalin, which acts upon the vessel walls, in that the pressure upon them is from without. Inasmuch as the induration lasts many days, with a tendency to increase somewhat within the first one and one-half hours, gradually subsiding for several days, we can readily appreciate its marked advantages over cocain and adrenalin, both of which are inclined to be very unstable in their hemostatic action, subjecting our patient to the ever-present danger of either primary or secondary hemorrhage. The prolonged presence of this infiltration likewise permits our healing process by granulation to become well advanced, thus avoiding to a great extent the possibility of adhesion between the anterior and posterior pillars, owing to the gradual subsiding of our infiltrations drawing our tonsillar pillars apart.

In conclusion, as to its value purely as an anesthetic: It has proven a most reliable one, always producing sufficient anesthesia, is rapid in action, and sufficiently permanent to proceed with operation without being compelled to interrupt our technic to make further application. The great majority of patients operated upon freely expressed themselves as suffering from no pain whatever other than the always prevalent tendency to swallow during operation, which fact is a question of the patient and not the anesthetic.

In conclusion, its use has proven the following advantages:

1. Its absolute nontoxicity in even as strong solutions as ten per cent.

2. Always produces sufficient anesthesia to complete our operation without the necessity of stopping to make further application or injection.

3. Marked diminution of after-pain and discomfort.

4. Its superior advantages over cocain and its derivatives, due to its nonsystemic action.

5. Absolute absence of troublesome primary or secondary hemorrhage; this being one of the frequent and dangerous drawbacks, especially in the type of cases so often the subject of tonsillectomy by local anesthetic.

6. The readiness with which our solution may be sterilized; frequently repeated high temperatures producing no chemic or physiologic change.

LXIII.

THE MASTOID OPERATION DEPENDENT UPON PATHOLOGY.*

By Cullen F. Welty, M. D.,

San Francisco.

For some thirty years or more the duration of a discharging ear put it in one group or another in regard to operative procedure.

In this paper I wish to deal with children under fifteen years of age with discharging ears that have lasted one year or more. This one year period was established long ago by surgeons more eminent than myself.

I wish to show by a series of operated cases that a radical mastoid should not be done as a routine procedure, as many of the cases will recover by the simple operation. In other words, the pathologic findings before and during operation should determine the kind of operation to be done.

The contraindications to the acute mastoid operation in chronic suppurative otitis media in children under fifteen years of age may be divided into two groups—those that may be present prior to operation, and those that are found during the operative procedure.

All cases of proven tuberculosis of the ear should be excluded.

Group 1.—(a) Acute exacerbation of the chronic suppuration associated with cerebral symptoms.

(b) Vertigo, nausea, vomiting, nystagmus or facial paralysis.

(c) Acute or chronic labyrinthitis, or destruction of the labyrinth, fistulæ of the labyrinth, cases that react to the fistulæ symptom, also partial or complete destruction of the tympanic wall, true cholesteatoma.

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*Read before the Pacific Coast Oto-Ophthalmological Society, June 15, 16 and 17, 1915, San Francisco, California.

Group 2.—(a) Cholesteatoma.

(b) Fistulæ of the semicircular canals.

(c) Such extensive bone disease of the walls of the attic and antrum that it cannot be removed with certainty.

This paper is based upon twelve cases in which the double mastoid operation was performed. Two of the cases were acute exacerbations of the chronic suppuration. All but one recovered from the discharge.

This particular case was well for some months, returning with a fistula through the bony attic wall. This was not seen prior to operation because it was one of the cases of acute exacerbation with the meatus almost closed.

I do not understand why it was not seen in the after-treatment. My only explanation is that it was mistaken for the perforation of the drum membrane and was finally healed completely.

As I said before, this case returned with a discharge and granulations coming from this perforation, low down on the tympanic wall. There must have been a slow carious process going on within the tympanic cavity. However, this never gave any distress. Reoperation will be required.

Schwartze's operation was originally performed for both acute and chronic cases. Some of the chronic cases did not recover, and at this time Stacke described an operation that was to cure the chronic cases particularly. This held for some time, or, rather, divided the honors with the Schwartze operation.

Neither of them was satisfactory until Zaufal combined the two operations, calling it the radical mastoid operation—used only in chronic suppurative otitis media, while the Schwartze method became the accepted procedure for the acute process.

The Stacke operation is done at the present time only when the sinus is so far forward that no other operation is possible.

In 1904 Jansen was doing an operation in chronic suppurative cases that never became popular enough to have a name. In this procedure he took most of the posterior wall down, but did not disturb the annulus tympanicus. He also took away as much of the attic wall as was possible in a given case, leaving the ossicles in place, so that they could be seen during or at the completion of the operation. He did not disturb the posterior membranous meatus. The case from this on was treated as we treat our acute mastoid operations of today. This procedure was not entirely satisfactory and it was abandoned.

Some time after this, Heath of London introduced a universal operation for acute and chronic cases. This consisted in cutting down the posterior wall to the annulus tympanicus, destroying all the mastoid cells, cutting the posterior membranous canal and pushing it into this newly made cavity. The outer wound was closed; further treatment was through this posterior hole in the meatal wall.

This procedure is not entirely satisfactory in the hands of all men. In fact, no one operative procedure will be good in all cases.

With the array of facts as I have presented them, you can see why I have gone to the Schwartze operation in only selected cases.

I maintain that by going down to hard bone over your entire cavity, in cases such as I have selected, the hearing will be as good, or more than likely better than it was before the operation, Also, the after-care of the ear will be eliminated, and that will be a great factor.

Furthermore, if the case does not entirely recover, the radical mastoid may be performed.

LXIV.

A CASE OF ENDOTHELIOMA OF THE TRACHEA.

By Charles Goodman, M. D.,

New York.

In 1906 Theisen collected eighteen cases of primary tracheal sarcoma and twenty-four cases of carcinoma of the trachea. Since Theisen's paper there have been six cases of malignant tracheal tumor by Berens, Kaunitz, Simmell, Eidenheim, and Najer, to which may be added that of Heymann, which was histologically similar to the Henrici case, described in Keen's Surgery, Vol. III, p. 497, as an "elongated roller shaped tumor occupying the posterior wall and attached by a broad base, and histologicaly resembling the salivary gland tumors (endotheliomata)."

Heymann's case was a man of thirty-two years, with a tumor somewhat more than the size of a bean, situated just above the opening into the right bronchus. The tumor was extirpated in two sittings, with the Brünning forceps, but there was a relapse, and Professor Gluck then severed the trachea immediately under the cricoid cartilage in the cricotracheal ligament, retaining at most one or two tracheal rings. The epithelium over the tumor was pavement epithelium, so, according to Borst's definition, it was classed as an endothelioma.

As far as I have been able to see from the literature, there are thus only two cases of endothelioma of the trachea which have been reported. In view of the rarity of such cases, one recently operated upon by the writer is doubly interesting, as an operative technic seldom practiced was carried out. The technic is suggested on page 498, Keen's Surgery, Vol. III.

CASE HISTORY.

S. F., aged twenty-one years, tailor. Admitted on April 12, 1915, to the hospital. He had had the usual childhood diseases. When fourteen years of age he had had tracheotomy performed for threatened asphyxia during diphtheria. Following this operation he was perfectly well for five years, until 1912, when he consulted Dr. W. Freudenthal for dyspnea, which had gradually been growing worse for the past two months. Examination at that time disclosed a normal condition of the upper air tract, while below the glottis a crescentric mass with the concavity forward could be outlined.

An attempt was made to remove this diaphragm-like mass under local anesthesia by direct tracheoscopy. The patient did not tolerate the manipulation, and further efforts were postponed for ten days. He was then anesthetized and the tracheoscope was introduced. Asphyxia ensued, requiring immediate tracheotomy. Ten days later several granulation masses were removed through the tracheotomy wound (December, 1912). The patient was relieved for a short time only, when dyspnea again set in. November 8, 1914, an examination revealed a reddish mass in the trachea, extending apparently over the greater part of the circumference, just below the cricoid cartilage. On November 14th, rectal anesthesia was administered, and a removal of this mass through the tracheoscope was attempted. Severe hemorrhage set in, necessitating the interruption of further operative procedure. One week later tracheotomy was performed under general anesthesia, exposing the neoplasm. Its removal was accompanied by a moderate amount of bleeding. This case was presented before the Section on Laryngology of the Academy of Medicine, February 24, 1915.

Although radium had also been introduced into the trachea, there was a rapid recurrence of the growth. The patient first came to the notice of the writer in April, 1915.

Physical Examination.—Scar at median line of the neck at site of the previous operation. The patient denied venereal disease, and the Wassermann reaction was negative.

Operation, April 14, 1915 (Drs. Goodman and Freudenthal).—A tube was introduced into the trachea by way of the mouth, and intratracheal anesthesia was administered by Dr. Ehrlich. A median incision exposed the trachea. The trachea was then mobilized. This was found extremely difficult on account of dense adhesions as the result of previous operation. After the trachea was freed from its surroundings it was opened, revealing a soft, irregular, nonpedunculated tumor situated on the right wall of the trachea, one ring below the cricoid cartilage and extending over an area of two tracheal rings. These two rings were resected, leaving the posterior membranous wall in front of the esophagus. With chromic gut sutures the two severed ends of the trachea were approximated. A low opening was then made in the trachea below the line of suture and a tracheotomy tube inserted. Small gauze drains were inserted on either side of the trachea. The remainder of the wound was sutured and a dry dressing applied. The tube was removed on the fourth day and the wound allowed to close by granulation.

With the exception of steam inhalation, no special postoperative treatment was required. The patient had an uninterrupted convalescence. The attacks of dyspnea have not returned up to the present time.

PATHOLOGIC REPORT.

Dr. Alexander Fraser of New York University said that the tumor presents all the characteristics of those forms classified as endothelioma. On the other hand, Dr. MacCallum and Dr. Pappenheimer agree with Dr. Lambert, that endotheliomata do not occur except in the meninges. Dr. MacCallum is inclined to regard the tumor as of probable epithelial origin.

We feel justified, however, in retaining the Borst and Henrici definition, approved by Keen, and more recently by Heymann, as well as by Dr. Eli Moschowitz of the Beth Israel Hospital, in the first pathologic report of this case.

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LXV.

TEMPOROSPHENOIDAL ABSCESS WITH UNUSUAL COMPLICATIONS.*

By John Leshure, M. D.,

New York.

The patient, Mrs. T., aged fifty-two years, first consulted me October 31, 1912, stating that she had been treated about two months for a boil in her right ear. Her previous history was negative, save for occasional attacks of headache and intermittent discharge from the ear.

Physical Examination.—The patient was a stout, phlegmatic woman, apparently in good health aside from the ear affection.

Examination of the ear revealed a marked swelling of the meatal wall which completely occluded its lumen and rendered impossible a view of the fundus. The auricle and adjacent tissues were infiltrated and edematous, and just above the zygomatic process, at a point one inch anterior to the meatus, was a diffuse swelling which suggested a deep temporal abscess.

Palpation of this area was exquisitely painful to the patient, but there was no tenderness over the mastoid process at any point. The temperature was 99°; pulse, 78; respirations, 20.

The tuning forks were heard normally over the mastoid, and lateralized to the affected side. Air conduction was zero. There was no vertigo. The eyes and reflexes were normal.

A diagnosis of deep temporal abscess complicating a chronic suppurative otitis media was made and the patient sent to the hospital for operation.

The following day, November 1st, incision was made over the temporal swelling down to the periosteum, but only a small amount of pus was found. This was evacuated and a wet dressing applied.

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*Read before the New York Academy of Medicine, Section on Otology, May 14, 1915.

The patient improved for the next few days, but on November 4th the temperature rose to 103.4°, the urine diminished in quantity and was found on examination to contain a large amount of albumin and numerous coarsely granular casts. The patient became drowsy and could be aroused only with difficulty.

Under appropriate treatment the condition cleared up, and at the end of a week she was sitting up and planning to go home. On November 11th the patient again became drowsy and complained of headache for the first time, but an examination of the urine showed only a trace of albumin and no casts. I then suspected an intracranial complication, either abscess or gumma, but no focal symptoms or signs could be elicited. On the following day, November 12th, I noticed that the right pupil was moderately dilated and reacted sluggishly to light. Examination of the fundus showed a slight haziness of the optic disc but no measurable elevation. The pulse, which had averaged up to this time around 72, dropped to 54; her temperature was 99.6°; respirations, 24. There was no nausea or vomiting. Cheyne-Stokes respiration was well marked.

There was no paralysis, but the reflexes were slightly exaggerated, and one curious phenomenon was present which was of considerable interest. This was a rhythmic movement of the right arm (i. e., the arm on the affected side). The Babinski and Kernig signs were both absent. The symptoms were evidently those of intracranial pressure, and the diagnosis lay between cerebral abscess, probably in the temporal sphenoidal lobe, cerebral hemorrhage, and brain tumor (gumma or malignant growth). With the history of previous ear suppuration, the evidence was decidedly in favor of brain abscess. That evening at ten o'clock a radical mastoid operation was done, practically without anesthesia, as the patient was unconscious. The posterior meatal wall was taken down, and when the antrum was opened it was found that its roof and the roof of the attic were dehiscent and the exposed dura was covered with granulations. The temporal bone was removed for a distance of an inch, exposing the dura covering the temporal sphenoidal lobe. The dura was dark in color, and the presenting lobe did not pulsate. The dura was incised and a slender knife entered the abscess cavity at a depth of one-half inch. About two ounces of thin, nonfetid yellowish pus were slowly evacuated, and the patient began to show signs of returning consciousness almost immediately—so much so that the anesthesia had to be resumed.

Particles of disintegrated brain tissue came away with the pus, which fact suggested that the condition was one of spreading encephalitis. Pulsation was immediately restored in the exposed lobe, and there was no evidence of meningeal infection. The patient was returned to bed in much better condition than before operation. Pulse, 120; temperature, 101.6°; respirations, 36.

On the following day, November 13th, she spoke rationally and took nourishment satisfactorily. She was given urotropin, grains eighty, p. d. Temperature, 102.4°; pulse, 108; respirations, 30.

November 14th complaint was made of severe headache, and there was some rigidity of the neck muscles. A lumbar puncture was made and about an ounce of turbid fluid withdrawn. This contained a large number of cellular elements and coagulated soon after standing. The predominating microorganism was the pneumococcus. The lumbar puncture was followed by a considerable improvement in the symptoms, and the patient had a fairly comfortable night.

The next day at 8:30 a. m. the temperature was 102°; pulse, 130; respirations, 34; but as the meningeal symptoms increased in severity towards the afternoon, another lumbar puncture was made, withdrawing about one-half ounce of turbid fluid.

There was some improvement in the character of the pulse, but at six o'clock the temperature had risen to 104.8°, with pulse of 160 and respirations, 62. Particles of brain tissue were mixed with the wound secretion, which was thin and watery, suggesting rupture into the ventricle.

The Kernig sign was present and most marked upon the right side. The patient died four hours later. Unfortunately, permission for an autopsy could not be obtained.

Comment.—The case is of interest chiefly from a diagnostic standpoint, and the question arises as to how long the abscess had existed.

The patient impressed me as a rather stupid individual, and her replies to questions were often evasive; but her relatives had not noticed any particular change in her mental condition, and there were no focal symptoms until the day of operation.

The results are apt to be more favorable when one can do a cerebral decompression, incising the dura, and waiting twenty-four hours, during which time the subarachnoid lymphatic space will become walled off and the probability of meningeal infection lessened. The support of the dura being thus withdrawn, the abscess is apt to evacuate itself or, at least, the pus will be found nearer the surface. In my case, however, no delay was permissible and the chance had to be taken.

Another question is whether the first attack of stupor was due solely to nephritis or partly to the beginning cerebral condition. I am inclined to think that it was entirely of uremic origin.

I have been unable to explain satisfactorily the predominance of the irritative symptoms (i. e., the Kernig sign and the rhythmic arm movements) on the affected side. A colleague stated that he had seen this phenomenon once before in a case of brain abscess, and explained it by a failure of the fibers to cross in the pyramidal tract. This case illustrates the danger of allowing a chronic middle ear suppuration to run on with imperfect drainage. If a radical operation had been done some months before, the patient's life might have been saved.

LXVI.

REPORT OF A CASE OF MULTIPLE ABSCESS OF THE BRAIN—OPERATION—RECOVERY.*

By John Guttman, M. D.,

New York.

Intracranial operations, especially for brain abscess following ear affections, are of comparatively rare occurrence. The report of a case presenting such a succession of events, especially when followed by recovery, is, in the writer's opinion, worthy of record.

Mrs. C. C., thirty-three years old, became sick September 13, 1914, with pain in the left ear. A few days later the drum membrane ruptured spontaneously. There was quite a copious flow of pus, and thereupon the subjective symptoms, as pain in the ear, headache, etc., subsided.

On November 8th, about seven weeks after the onset of the disease, I was called in and found the patient suffering very much, presenting all the symptoms of an acute mastoiditis and a possible intracranial complication. In addition to the objective symptoms, sagging of the upper wall of the ear canal, insufficient drainage of the purulent secretion of the cavum tympani, edematous swelling of the planum mastoideum, the patient complained of a very severe headache, nausea, sleeplessness, depression, and fever.

On November 9th I performed the usual mastoid operation. In the antrum there was only a small amount of pus, but a good deal of granulation tissue. The following two days the general condition of the patient improved very much. On the third day the temperature rose suddenly to 102°, with a pulse of 104. Excruciating headache localized on the left side. The following three days the temperature varied between 100° and 101°; pulse between 96 and 110. General malaise, nauseating feeling and (once) vomiting. There developed a slight drooping of left upper eyelid, a slight ptosis, a slowness of cerebration, and patient became somewhat irrational. Sensibility for touch and pain remained normal; the labyrinth reaction was normal, although the caloric test on the left ear showed a somewhat sluggish reaction. The eye grounds were normal; there was no Babinski, and no Kernig. As on November 11th, the frequency of the pulse became as low as 66, and an amnesic aphasia had developed (the patient could not name some of the most familiar objects or persons), it became apparent that we had to deal with a brain abscess or possibly only with an epidural abscess.

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*Read before the New York Academy of Medicine, Section on Otology, May 14, 1915.

On November 12th the patient was again placed under ether, and after removal of the squama of the temporal bone the temporosphenoidal lobe was exposed. The dura appeared normal, pulsating without any sign of a diseased condition. Thereupon the dura was split and the brain explored in different directions with a grooved director. When the director was inserted anteriorly and downward, about one ounce of thin, nonsmelling pus was evacuated. The abscess cavity was inspected with the Whiting encephaloscope; no lining membrane was noticed. Thereupon the cavity was packed with iodoform gauze and the patient returned to bed. The following day the patient was much improved; the temperature and pulse were normal; headache diminished and cerebration improved, but the amnesic aphasia continued. The patient was bandaged daily.

Five days later the symptoms suddenly became grave again. The headache returned, the pulse became slow again, and the aphasia became more marked. The following day the patient was again placed under ether and the brain explored in different directions. When the director was thrust upward in a vertical direction, towards the cortex of the brain, about half an ounce of thin, grayish colored pus was evacuated. Thereupon the pulse immediately improved considerably, jumping from sixty to about one hundred and twenty before the patient left the operating table. No drainage in the wound of the second abscess, and only the outer wound was dressed. The following day there appeared a colorless pulsating liquid (cerebrospinal fluid) in the wound. On December 20th, when the wound was nearly completely healed, the patient left my medical care. Her general condition, with the exception of some slight headache and slight remnant of the aphasia, was quite satisfactory. The fistula of the lateral ventricle was almost entirely closed. The mental condition was perfectly normal.

EPICRISIS.

According to Hammerschlag, brain abscess complicating chronic purulent otitis media is four times as frequent as brain abscess complicating acute purulent otitis media. According to Jansen's statistics, the relative frequency is one to six.

In the first operation for brain abscess, after exposure of the dura, there was no outward sign to indicate that in the depth of the brain substance there was pus. There was no outspoken hyperemia of the dura, no bulging—nothing but normal pulsation of the brain substance. It was very tempting to terminate the operation right then and there, and postpone the exploration of the brain for a later period, in the expectation that the symptoms might recede. The history shows that the clinical symptoms are more to be relied upon than the outward appearance of the brain cortex.

The evacuation of the second abscess cavity after the opening of the first abscess cavity seemed to have cleared up the whole process. There is no way of determining whether the second abscess was or was not in some connection with the first abscess; the second abscess might have been only an offshoot of the first abscess, so that the two formed a sort of a dumbbell shaped abscess; much more probably the second abscess was independent of and separate from the first one, as may be inferred from the following considerations: the second abscess was located in an entirely different direction from the first one, viz., straight upward and subcortically; and secondly, the encephaloscope disclosed no communication between the two abscess cavities.

The fistula of the lateral ventricle did not seem to have any serious consequences, for toward the end it nearly closed completely by itself. The recovery of the patient is undoubtedly to a great extent to be ascribed to the early operation before any severe destructive process of the brain tissue took place.

LXVII.

THE BACTERIOLOGY OF ACUTE OTITIS MEDIA AND MASTOIDITIS AND THEIR COMPLICATIONS—BLOOD CULTURES.*

By James Garfield Dwyer, M. A., M. D.,

New York.

During the last few years, more and more attention has been paid to the bacteriology of acute otitis media, mastoiditis and their complications, and as the writer has had an opportunity to examine and identify the organisms from a series of these cases, it was thought that it might be of interest to this section to report on the findings and to emphasize some of the points that seemed to be of importance.

It is our rule at the Manhattan Eye, Ear and Throat Hospital to take cultures from the mastoid cavity at the time of operation and to identify these organisms culturally and morphologically. It is usual, also, to take cultures from the auditory canal preceding operation. An analysis of the organisms found in acute and subacute mastoiditis follows. No reference is made to the organisms isolated in chronic otitis media, or those found when the radical mastoid operation is performed.

Analyzing a series of one hundred and seventy-four cases, taken in routine work from the mastoid cavity, we found that the streptococcus hemolyticus was present in about sixty-five per cent; the streptococcus viridans in five per cent; streptococcus mucosus capsulatus in twenty per cent; staphylococcus pyogenes aureus in eight per cent, and the balance comprised infections with bacillus mucosus capsulatus, bacillus pyocyaneus, pneumococcus and bacillus diphtheroid. One point is worthy of note, the fact that two organisms were isolated in ten cases: Staphylococcus pyogenes aureus with pneumococcus; streptococcus hemolyticus with bacillus pyocyaneus; staphylococcus pyogenes aureus with streptococcus; staphylococcus pyogenes aureus with pyocyaneus; streptococcus mucosus with pyocyaneus; streptococcus mucosus with bacillus mucosus; and finally, streptococcus hemolyticus with bacillus diphtheriæ.

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*Read before the New York Academy of Medicine, Section on Otology, May 14, 1915.

Thus the relative importance of the organisms can be seen—the very small number of infections with pneumococcus, the relatively large number with streptococcus mucosus, and the presence of others of very low pathogenic power. The statistics of the organisms found in cultures from the auditory canal in the ordinary otitis media cases, irrespective of whether the case progressed further to mastoiditis, are unsatisfactory, and the reports unreliable, as errors in technic play a very important part in the isolation of the causal organism. In other words, there is often no relationship between the organism found in the canal of the ear and that from the mastoid. The reason for this statement is the fact that in nearly all of the above cases of mastoiditis a preliminary culture had been taken from the canal of the ear, and it is very important to emphasize the fact that unless the greatest care is exercised in taking such cultures the findings are unreliable. Time and again the cultures taken in a routine way from the canal of the ear showed the various strains of staphylococci, when at operation the other organisms were found and no staphylococci were demonstrated. This is due to faulty technic, as the staphylococci have their natural habitat in the auditory canal, and unless the cultures are carefully taken from the secretion in the middle ear—that is, taken through the perforation in the membrane through a sterilized auditory canal—the results are not reliable, as the staphylococci easily outgrow the ordinary pathogenic organisms of more delicate growth. One thing that was worthy of note was the fact that many infections with the streptococcus mucosus capsulatus did not go on to mastoid involvement and cleared up in the usual way.

The next important point that we wish to make is the question of bacteremia and the importance of blood cultures. Blood cultures have come to be one of the most important and useful means at our disposal for diagnosis. We need only refer to their importance in typhoid fever and pneumonia, as an example of what may be done by their aid. Blood cultures have a special interest for the otologist, as in his province the source of infection of the blood stream is easily accessible to surgical interference as contrasted with infections in other parts of the system, such as infection of the uterine veins in puerperal infections. Moreover, blood cultures represent exact scientific methods of procedure, and it may mean the saving of days in the clearing up of the diagnosis, and may save a useless and unnecessary exploratory operation.

The great question for us to consider is the relationship of bacteremia to the infection. Do bacteria or can bacteria enter the blood stream in every case of local infection? They can and very often they do, and even the smallest focus may be the cause of a bacteremia. So that a bacteremia per se does not necessarily mean a fatal prognosis. In a short review of the literature on this subject we might remember that in perfectly healthy men organisms have been isolated from the blood: that muscle tissue removed from healthy animals under the strictest asceptic precautions has been shown to contain many of the ordinary pyogenic organisms. Hence, bacteremia must be considered in conjunction with other factors. Again, we must remember that the blood can rid itself of bacteria after infection, without any surgical aid, and in most cases does so. Again, we must differentiate between a simple carrying of the organisms in the blood and a condition in which the organisms are multiplying in the blood. There is no doubt but it is incapable of proof that thrombosis is present in a very large proportion of cases in which its presence is not even thought of. We are all familiar with cases in which we have found a thrombosed sinus at operation and which we leave alone and have recovery. It has already been walled off.

What is the significance of a negative blood culture? A bacteremia may be present and yet the blood culture be repeatedly negative. There are always several factors to be kept in mind in all blood culture work. Among these are the mechanical factors favoring a negative blood culture. There may be only a few bacteria present, and in the few cubic centimeters that are drawn you may not chance to get any of them. We have seen the organisms so numerous that we could just draw a drop of blood and stain directly for the organisms and show them, and, on the other hand, we have repeatedly drawn twenty-five cubic centimters and then get maybe only one colony.

Again, the optimum medium may not be used or the blood may be too concentrated to allow growth, or the action of the blood itself may inhibit the growth. Again, in many cases there is only an intermittent bacteremia, the organisms being discharged into the blood only at certain intervals from a focus, and if the culture is not taken when the organisms are circulating there may be no growth. Hence, the importance of taking cultures repeatedly, not depending upon a single culture, and the importance of taking cultures at suitable times.

Regarding positive cultures, such a culture is one of the greatest aids in diagnosis and prognosis that we can have. Time and again, when the clinical condition pointed rather to malaria or to typhoid or pneumonia, the finding of the causal organism in the blood has pointed to the true condition. This has been true in cases in which the last condition to be thought of was sinus thrombosis, and yet such was proved to be the case. We can learn a great deal from repeated cultures in cases in which we have once obtained a positive result. In cases in which the number of organisms is lessening, or in which the organisms have disappeared and in which the primary focus has been successfully treated, a good prognosis is probable. On the other hand, when the primary focus has been eradicated and there are no metastases, including of course endocarditis, and the organisms are still present, then we may assume that the organisms have become habituated to their host and are multiplying in the blood, and a poor prognosis is probable.

Again, it might here be emphasized that bacteremia results from extensive surgical measures in the throat, such as tonsillectomy, and especially from improper surgical intervention in the mastoid, such as wounding the sinus. This class of cases has been admirably dealt with by Dr. W. A. Scruton in a paper last year, and two additional cases have come under my notice recently, one recovering after the formation of metastases and the other going on to a fatal termination. A short résumé of these is to follow.

The most important thing, to our mind, is the fact that nearly all of our cases recovered, that the percentage of recoveries with sinus thrombosis is getting steadily larger. Surgical intervention is not always necessary, as is evidenced by the cases reported by Dr. McKernon last year, where, in the face of positive blood cultures in two cases, operation was refused but recovery ensued spontaneously, either with the use of vaccine or without. It might here be added that in most of our cases vaccines have been used, and they seem to exert a decidedly beneficial action. These cases will be reported when the series is large enough to warrant.

A few cases will now be cited to illustrate some of the points mentioned above:

Case 1.—Bacteremia, extending through mastoid and secondary to mastoiditis and sinus thrombosis, caused by surgical measures in the nasopharynx. Removal of nasopharyngeal tumor. Double mastoiditis, sinus thrombosis and metastases. Blood cultures repeatedly positive—the streptococcus mucosus capsulatus. This organism was demonstrated in the nasopharynx, the middle ear, mastoids, in blood culture, in the clot from sinus and the sinus wall, and finally in pus from the ankle joint. Blood culture finally became negative and recovery took place. It might be noted that this organism is often found in the normal throat.

Case 2.—Bacteremia following tonsillectomy. Patient admitted for acute otitis media. Ear cleared up. Within a week the tonsils were removed. Following this the patient became septic, and repeated blood cultures finally showed the presence of streptococcus hemolyticus in large numbers. Blood cultures taken when the temperature was low were generally negative, and when high showed many organisms, thus emphasizing the importance of the time of taking a culture. Nothing further surgically was done for this case and she went on to complete recovery.

It is interesting to note in this case that we had an acute ear condition to deal with at first, but that the bacteremia seemed to be due to the tonsillectomy. This patient had a perfectly normal temperature at times at which we had very positive cultures.

Case 3.—Illustrating the effect of injury to the lateral sinus. In the course of a radical mastoid operation the sinus was accidentally opened. The organism that had been isolated in the ear discharge had been the streptococcus mucosus capsulatus. The patient did poorly for a long time after the operation, and gradually went into a septic condition, giving positive cultures of the above organism. A metastasis into the lung took place, but after resection of the jugular the patient gradually recovered after a convalescence of ten weeks.

Case 4.—Injury to sinus, followed by death. Simple mastoidectomy. Sinus accidentally opened by the curette. Hemorrhage stopped by iodoform gauze. Normal course of convalescence with no evidence of sepsis. Three weeks after, the patient returned from out patient department to ward, delirious and very ill. Blood culture shows a growth of streptococcus hemolyticus in less than eight hours. Immediate operation. Sinus found thrombosed and jugular vein thickened and thrombotic. Death occurred within twenty-four hours.

The importance of such a case, aside from the injury to the sinus, is that it shows the typical course of such a case of thrombus. Immediately after the injury we have the formation of a clot and the shutting off of the vein. At this time the few bacteria that may be in the clot are prevented from reaching the blood stream, and in some cases they are killed off by the action of the antibodies of the blood serum. Later on if these are not killed off, the clot undergoes purulent softening, as it did in this case, and septicemia and death ensue. There is no doubt that if such cases are seen early enough the resection would limit the process.

Case 5.—Case in which paratyphoid was isolated from the blood.

LXVIII.

REPORT OF A CASE OF INTENSE VERTIGO RELIEVED BY PUNCTURE OF THE DURA IN THE NEIGHBORHOOD OF THE INTERNAL AUDITORY MEATUS.*

By L. W. Dean, M. D.,

Iowa City.

Mrs. J. O., family physician, Dr. Evans of Grinnell, Iowa; was referred to me by Dr. C. P. Howard, on October 4, 1914, for examination as to the cause of vertigo.

History.—Mrs. J. O.: entrance complaint, stomach trouble; extreme vertigo with vomiting. Patient is white, aged fifty years, born in England, came to this country about six years ago. We were able to secure a very complete family history, which was entirely negative so far as the patient's trouble is concerned. Patient has had measles, smallpox, tonsillitis twice in the last six years. Eighteen years ago the patient had rheumatism with swollen elbows, wrists, knees and ankles. At this time she was in bed for six weeks, and was so ill a part of the time that she was unable to feed herself. Since that time she has had occasional insignificant pains in the joints. There has been no chronic cough. Before marriage she was subject to asthmatic attacks. The patient was married at the age of twenty-two; had eight children, five of whom are living. One child died at the age of two days. One, the first child, at the age of one month. And the other, the third child, at the age of eleven months. Patient had one miscarriage after the last child. Menses began at the age of eighteen and became regular after the age of twenty-one. Menopause has not yet occurred. Patient states that she has always had slight temporal headaches, beginning in the morning and lessening during the day. Patient has never had any earache or discharge from either ear. At the age of seven or eight she fell down stairs and was knocked unconscious. Immediately following the fall she was unable to hear any sound. She remained deaf in each ear for about two years. She does not remember how her hearing was restored, whether suddenly or gradually. This part of the history is necessarily exceedingly unsatisfactory. Careful questioning of the patient last fall and again within the last few weeks has failed to reveal any more definite information. I got the impression that she was not entirely deaf in each ear. If so, the return of hearing would have made a more distinct impression.

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*Read before the Chicago Laryngological and Otological Society, April 20, 1915.

History of present trouble.—Three and a half years ago the patient noticed that she had slight attacks of dizziness. Six months later, with the attacks of dizziness there was vomiting, and at this time she began to be bothered with noises in the head. One year later—that is, two years ago—she noticed that the hearing in the right ear was getting poor. These attacks greatly increased in frequency and severity until now she is having them once or twice a week, and they are so severe that it is necessary for her to go to bed. The only way that the patient can get relief is by sleeping. These attacks come on at any time during the day, sometimes they make their appearance when she is asleep at night, the nausea causing her to wake up. Patient states that she has never been unconscious during one of these attacks. She often falls if there is nothing for her to get hold of. If there is a table or some support handy, she has no difficulty in getting hold of the object and supporting herself. If she is engaged in hard work the number of attacks greatly increases, sometimes being as many as five a day. The attacks come on without warning and without an appreciable cause. When lying in bed it seems as if everything were sinking from her. She is intensely nauseated and vomits continually. Lying down or changing her position does not help the matter at all. The attacks last from a few minutes to several hours, but some dizziness always remains throughout the day of the attack. If she can get a sound sleep she is not nauseated again until she has another attack. The vomitus is not sour. Sometimes it is burning, and again bitter. There is no pain about the head preceding or during these attacks.

Shortly after the patient was referred to our service she had an attack. The attack was very similar to the one which she described. The patient fell to the right and fell onto one of the patients lying in an adjacent bed. After the attack was over she was questioned carefully about this, and had no remembrance of having fallen upon the bed. The attack which the patient had was exceedingly severe, the vomiting and the retching causing much misery.

The patient is a fair haired woman with a sallow complexion. She gave the impression of being very uncertain of herself and of undergoing much suffering. That she was emaciated was evidenced by the rapid increase in weight after the eradication of the trouble.

Dr. Howard's examination of the general condition and of the nervous system was negative, except for a distinct Rombergism with the eyes closed. There was nothing about her gastrointestinal tract that would be responsible for her vomiting.

The patient remained in the University Hospital and was under constant observation from October 2d, the date of her admission, until December 26th, the date of her operation. It was only after the prolonged careful study of her case that operation was advised. I will take up the history in her case and give the findings as they changed while she was under observation.

A Wassermann test of her blood and spinal fluid was made on admission. At various times while in the hospital spinal punctures were made. Several times the Wassermann test was made. At the time of operation a Wassermann test was made of the cerebrospinal fluid removed from the posterior fossa. In every case the reaction was negative. For a period of six weeks, while the patient was in the hospital, active syphilitic treatment was given without result. In short, during this time the patient became gradually worse.

Bromids were administered also without result. Fluid was withdrawn from the spinal canal at various times, both during attacks and intermissions. In every case the pressure was normal and the laboratory report negative. The influence of the spinal puncture upon the attacks was marked, the vertigo and vomiting always being lessened within a short time, but never entirely controlled.

The attacks.—In the early part of the patient's stay in the hospital she had one or two attacks a week. The attacks were similar to those described in the history. During the two months that she was under observation they increased in severity and frequency. During the attacks the patient had a tendency to fall to the right. In the periods between the attacks, with her feet close together and eyes closed, she would fall to the right and backwards. In the earlier attacks a slight rotatory nystagmus to the right could be detected. During the quiescent periods there was no spontaneous nystagmus. When the nystagmus was present the patient would fall to the right, irrespective of the position of the head. This nystagmus was more marked with the succeeding attacks, and in some of the later and more severe attacks the rotatory nystagmus was present to the right and to the left, but always far more marked to the right. During the latter part of the time that she was under observation, spontaneous rotatory nystagmus to the right could be detected between the attacks. Fields and fundi were normal. For several weeks preceding the operation the patient complained of occasional attacks of pain in the occipital region. There was no pain on pressure over the mastoid vein.

Examination of the ears on admission.—Right ear: loud spoken voice heard at four inches. Power of hearing low notes normal. High notes markedly diminished, C_4 not heard at all; Rinné negative; Weber to the left; drumhead normal; tube open. Left ear: whispered voice at thirteen feet; Rinné positive; limits for low and high notes not constricted; drumhead normal; tube open.

The hearing in the right ear gradually diminished while under observation, and in about six weeks the right ear was absolutely deaf. The left ear remained apparently normal.

Caloric test.—Right ear, with water at sixty-eight degrees, positive reaction in thirty seconds. Nystagmus lasted two minutes. Left ear, approximately the same. The caloric test was applied to the right ear a number of times while she was under observation, and again following her operation, and finally during the last week. It was always the same.

Following the operation there was slight change in the hearing in the right ear. A test was made a few days ago, and the patient could hear the loud voice but not recognize the word.

Pointing tests.—At all times the reactions in the legs and elbow joints were normal. Up until the patient had been under observation six weeks the pointing test for the wrist joint was also normal. About the seventh week of observation the following reactions were noticed: Wrist motions in the absence of nystagmus, right hand palm down, finger to the right. Right hand palm up, no deviation. Left palm down, no deviation. Left palm up, no deviation. Induced nystagmus to the right, using cold water in the left ear: right palm down, finger deviates to the right. Right palm up, finger deviates to the left. Left palm down, finger deviates to left. Left palm up, finger deviates to left.

The persistence of the deviation of the finger to the right with the palm down was perfectly plain. The test was repeated several times and demonstrated to various observers. Because of the nystagmus to the diseased side, or when present in both sides, more marked to the diseased side, the tendency to fall to the right and backwards, irrespective of the nystagmus and the position of the head, the gradual increase of the nystagmus, always remaining more marked to the diseased side, and because of the condition being relieved by spinal puncture, a lesion in the posterior fossa was diagnosed.

It was difficult to conceive of any lesion except a cyst or a collection of fluid between the meninges that would persist for three years without becoming much worse than it now was. So before the pointing test was positive for a cerebellar lesion, a diagnosis of a collection of fluid in the posterior fossa in the cerebellar pontine angle was made, and exposure of the dura with massage or puncture advised. With the appearance of the pathologic pointing test a positive diagnosis of lesion in this neighborhood was made, and operation more strongly urged. Early in December the patient's condition was such that she was willing and anxious to try almost anything, and on December 26th she was operated.

Operation.—December 26, 1914, under ether anesthesia, the usual mastoid incision with a posterior horizontal incision at right angles to it was made. The lateral sinus was exposed. It was found to lie far forward near the wall of the external auditory canal. The antrum was opened and the dura of the cerebellum exposed internal to the ascending limb of the lateral sinus. Following our usual custom when incising the dura, the dura was painted with tincture of iodin and the wound thoroughly dried. A vertical incision one-half inch long was made in the dura three-fourths inch internal to the laterl sinus at a distance of three-fourths inch below the knee. When the dura was first incised there was but a slight flow of fluid and the brain substance prolapsed in the wound. In about one-half to one minute after the completion of the incision it acted very much as if something broke, and clear fluid flowed from the wound as water flows from a spring. Dr. Charles Rowan, who was present at the time of the operation, as well as myself and other observers, was very much impressed by the force of the escaping fluid. About three and one-half test tubefuls of fluid escaped. There was no change in the patient's pulse or respiration at the time the dura was punctured or when the fluid escaped. I regret very much that we did not have prepared a special manometer for measuring the pressure of the fluid. A specimen was sent to the laboratory, and reported as apparently normal cerebrospinal fluid mixed with blood. There was no increase in leucocytes, and the Wassermann was negative.

Following the operation there was no disturbance of the facial nerve. Two days later the patient complained of slight dizziness after she first opened her eyes. This lasted but a few minutes. There was a slight rotatory nystagmus to the right. Three days after the operation the nystagmus had entirely disappeared. Several times in the four days following the operation the patient complained of attacks of nausea and dizziness. Each time these were immediately relieved by dressing the wound. At each dressing some cerebrospinal fluid escaped.

On the eighth day following the operation the patient suffered from slight nausea and vomited. There was a little rotatory nystagmus to the right at this time. On the ninth day she had a similar attack. After that her recovery was uneventful. There were no further attacks or vomiting, no rotatory nystagmus.

Four weeks after the operation careful examination was made. There was total deafness in the right ear. Caloric test in the right ear was positive in one-half minute; pointing tests were normal. The patient had a good appetite, was eating well and gaining weight. Six weeks following the operation the patient left the hospital.

She returned for examination on April 9th, about four months after the operation. She reported that since leaving the hospital she had not had any trouble whatever except deafness in the right ear and a slight tinnitus aurium. She has increased in weight, appetite is good, and she feels exceedingly grateful for what has been done.

Examination.—Right ear, can hear loud sounds, but is not able to recognize the voice. Caloric positive in one-half minute. Pointing tests are normal. There is no Rombergism; no spontaneous nystagmus. The patient feels that she is entirely well.

Our diagnosis before operation was a collection of fluid in the cerebellar pontine angle, probably the result of adhesions between the meninges as a result of her injury forty-two years ago. The findings at the time of operation, together with the results, lead me to think that the diagnosis is correct, notwithstanding the fact that an exact determination of the condition present could not be made.

The case is very similar to the cases reported by Bárány, except in his patients, immediately following the spinal puncture the patients became worse and then were later relieved, while with the case just reported the partial relief followed immediately the spinal puncture.

As to whether the loss of hearing is due to pressure directly upon the nerve, or to increased pressure within the cochlea, I do not know. The other cranial nerves located in the cerebellar pontine angle did not have their function disturbed. With the very slight increase in hearing in the four months following the operation the prognosis for the return of hearing, in my judgment, is very bad.

LXIX.

THEORIES CONCERNING PARACUSIS WILLISII.*

By George M. McBean, M. D.,

Chicago.

Since 1672, when Dr. Thomas Willis[1] of Oxford and London published his report of the first case of that form of paracusis which bears his name, many theories have been advanced to explain the phenomenon. But from the variety of opinion by the world's great otologists and physicists, it is evident that there is room for at least one more theory.[2] It stirs one's imagination to read of the seventeenth century highborn lady who was very deaf under ordinary circumstances, but heard quite well during the rolling of drums, so that when she went walking she was always followed by her servant who carried a drum; and when she desired conversation her servant would beat the drum, so that she might hear. I think this is the most picturesque case of paracusis Willisii in literature.

Numerous other instances were later reported of deaf persons who heard better in noisy places, and it became generally recognized that this was an unfavorable symptom. It remained for Politzer[3] to show that it was not necessary to have noise to produce improved audition, for, as he found, a toneless, rapidly vibrating intrument brought into contact with the cranial bones will produce the same result. This proved that it was not tones and noises as such, but only as modes of motion, which were causative factors. The symptom as usually described is that the patient hears better riding in vehicles, trains and street cars or in machine shops.

Joseph Toynbee was the first to show that paracusis Willisii belongs to the symptom complex of stapes ankylosis, especially of the otosclerotic type. (Lucae.[4]) In fact, it is one of the most characteristic symptoms of otosclerosis. Körner[5] says it is the only phenomenon of this disease that is not cleared up by the anatomic findings.

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*Read before the Chicago Laryngological and Otological Society, April 20, 1915.

According to Politzer, Lucae and Roosa, it is never found in cases of nerve deafness unless complicated by trouble in the sound conduction apparatus.[6] But, on the other hand, it is not constant in all cases of otosclerosis, or even in both ears of the same patient. This reminds us of the fact that the disease process involves various parts of the labyrinthine capsule in different cases, as shown by section. It is unfortunate that so few cases diagnosed as otosclerosis with full examination records ever come to autopsy, and I am not aware that any mention of the peculiarities of paracusis Willisii has been made in the cases published. When Norval Pierce published his masterly paper in 1907 on spongification of the labyrinthine capsule, less than forty cases had been reported in which the diagnosis made during life was confirmed by section.[7] But, according to our present knowledge of otosclerosis, it is the cases with most marked loss of lower tone limit—i. e., those with most marked stapedial fixation—that show most characteristically this form of paracusis.[8]

It is interesting to review a few of the theories advanced by our modern writers, especially keeping in mind the known pathology. There is so little written directly concerning paracusis Willisii that I cannot refrain from quoting from the address of Charles J. Heath, published in 1911,[9] though there are few who will agree with his premises or conclusions. He says: "The action of the stapedius muscle is to pull the head of the stirrup bone backward and drive part of the footplate, accompanied by the membrane surrounding and attached to it, against the labyrinthine fluid." . . . "Its effect in increasing the pressure on the fluid in the tiny closed labyrinth is considerable, and scarcely any obstructive tympanic condition (save the rare bony fixation of the stirrup) is capable of completely arresting its action, which is to increase labyrinthine pressure."

It will be noted that this is directly contrary to the accepted teaching that the stapedius muscle tilts the footplate out (thereby antagonizing the tensor tympani) and decreases labyrinthine pressure.

And when Mr. Heath speaks of the deafness accompanying paracusis Willisii as "pocket handkerchief deafness" with "relaxed drum membranes and joints," it is evidently of a clinical entity which is not the same as we are accustomed to regard as the usual accompanying factors of paracusis. As he gives none of his tuning fork findings, I am unable to say whether or not Bezold's triad is present. It is sufficiently evident, however, that he does not agree with his distinguished predecessor, Joseph Toynbee,[10] who regarded paracusis Willisii as especially characteristic of the later stages of stapes ankylosis.

Phillips[11] and Gould[12] say that it is "supposed to result from compression of the labyrinth in the form of otopiesis," "with contraction of the tensor tympani muscle." The question here is what possible effect could contraction of the tensor tympani muscle produce in the presence of an immovable stapes, and why the labyrinth could be compressed?

Dench[13] says: "Urbantschitsch explains the phenomenon by the action of loud sounds serving to stimulate the receptive centers, after which relatively feeble stimuli may be perceived." But he offers no basis for this theory. And if true, why should not persons with normal hearing hear better in noisy places? Dench further says: "The acuteness of audition upon one side for any given sound will be increased if the organ of the opposite side is at the same time brought under the influence of sound waves of a different character." The error of this proposition is demonstrated daily at the telephone when one naturally stops the open ear with the finger to shut out annoying extraneous sounds.

Politzer says: "Löwenberg and Urbantschitsch attribute this phenomenon to an increased irritability of the acoustic nerve, brought about by general concussion." This I admit to a certain extent, but why, then, are all forms of deafness, and especially the nerve type, not also benefited by noise and concussion, which we know absolutely is not the case?

Politzer[14] himself comes nearer the root of the matter than the others when he says: "The terminations of the acoustic nerve are also thrown out of their equilibrium, which causes them more easily to be excited by the waves of sound." He believes the shaking of the ossicles is also responsible.

Bezold[15] in Holinger's translation says: "It is, therefore, probable that a practically immovable sound conduction apparatus is more sensitive to weaker impulses during the time when a shaking of the whole body keeps it vibrating."

It seems like heresy to question these master minds, but it must be asked if there is any longer a sound conduction apparatus when its most important link, namely, the fenestrostapedial articulation, has become ossified? The sound conduction apparatus has then ceased to exist as a specialized mechanism.

The hypothesis which I advance, with some temerity, it is true, is built on grounds which have been widely accepted by otologists and physicists. The only added factor which I ask you to accept is that our atmosphere is in constant motion, and few who live in Chicago will deny that.

I quote from Bezold[16] again: "Edward Weber advances the theory that the whole sound conduction apparatus, together with the column of water which runs up the scala vestibuli and back the scala tympani, moves backward and forward as a whole with each sound wave. The very flexible and yielding membrane of the round window acts as a siding." Von Helmholtz found the mathematic proofs for the accuracy and even necessity of this theory. He taught us, furthermore, that the drum membrane, together with the ossicles, forms a wonderful lever apparatus which is able to convert large movements of low power into small movements of high power at the footplate of the stirrup, which is suspended at the ligamentum annulare. (Edelmann, 1: 778.)[17]

This whole apparatus, according to Riemann, is so well balanced that the smallest amount of energy is sufficient to overbalance it.

Toynbee[18] says, in speaking of stapes fixation: "The membrane of the fenestra rotunda and the fluid of the labyrinth participate in this fixed condition."

If we accept these theories of Weber, von Helmholtz and Riemann as true, then we must admit that normally the lymph as a whole is in constant to and fro motion. Shambaugh[19] has pointed out the similarity in nerve endings between the vestibular and cochlear apparatus, cupula and otolith in one case corresponding to the tectorial membrane of the hair cells of Corti's organ in the other.

Our present conception of the movement of fluid as a whole in the semicircular canals, in order to make the nerve endings in the ampullæ capable of perceiving motion, must be comparable to the movement as a whole of the fluid in the spiral canals of the cochlea, in order to make the nerve endings there capable of perceiving sounds.

But the fluid of the vestibular portion is influenced only by motion or position of the head, while the fluid in the cochlear canals is constantly being moved by the footplate of the stapes.

It is the low pitched sounds which have the greatest amplitude of vibration. Even vibrations in the surrounding air too slow to be perceived by the human ear as sound may still have their influence in moving a normal stapedial footplate, and so keeping the cochlear lymph in constant motion.

Bezold,[20] by manometric measurements, found "that the membrane of the fenestra rotunda was capable of an excursion of more than one-third millimeter, while that around the base of the stapes was only one-sixteenth millimeter. The membrane of the fenestra rotunda is therefore capable of performing excursions five times greater than that of the footplate of the stapes."

This lax membrane, together with the aqueductus vestibuli and cochleæ, acts as a siding or safety valve to prevent sudden compression of the labyrinth from injuring the delicate terminations of the auditory nerve.

In otosclerosis producing ankylosis of the stapes the low-pitched sounds are lost, and, therefore, the greater the degree of ankylosis, the less movement of the fluid in the cochlea, as was pointed out first by Toynbee.

But, as we know, sounds and soundless vibrations are practically ever present, so the normal relation of the tectorial membrane to the hair cells of the organ of Corti[21] must be in a moving fluid, and these to and fro movements must keep these nerve terminations in a certain state of tension. When mass motion ceases through stapedial ankylosis, this relation is no longer normal, and the auditory nerve becomes less capable of responding to sounds in proportion to the loss of motion of the endo- and perilymph.

In the normal ear the function of the membrane of the fenestra rotunda is a passive rôle; it is only when the normal agent for producing motion in the cochlear fluids (i. e., the stapes) become ankylosed that the membrane of the round window assumes a more active rôle. But it requires a great stimulus to do this, vibrations of wide amplitude and great power, as the rolling of drums, the whirr of heavy machinery, the roar of a railroad train, or the rumble of a wagon, which cause such a commotion that the relatively lax membrane of the round window, and with it the cochlear lymph, move back and forth in something like their normal motion. At the same time the hair cells attached to the tectorial membrane, stimulated by the ebbing and flowing lymph stream, resume their function as sound receivers, and so continue as long as the artificial mass motion continues. This is the paracusis which Willis described, and which has remained unexplained for two and one-half centuries, waiting for Shambaugh's theory of tone perception to unlock the door.

A necessary corollary of my hypothesis is that in cases of bony stapes ankylosis without paracusis Willisii, the process of spongification must have involved the recess of the fenestra rotunda, thereby preventing all mass motion of the cochlear lymph, and these cases would probably show a greater loss of upper tone limit.

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LXX.

THE POSTOPERATIVE ANTISEPTIC TREATMENT OF THE TONSILLAR FOSSÆ.*

By George Paull Marquis, M. D.,

Chicago.

It is not my purpose this evening to say anything on the question of tonsillectomy versus tonsillotomy, nor on the respective merits of the dissection method or the Sluder operation. Far be it from me to start anything—the champions of the various forms of technic can rest easy on this point. I do, however, wish to make known a procedure which I have followed for a year, and which has greatly reduced the unpleasant after-effects of a tonsillectomy.

I used to be confronted with a number of conditions which were decidedly unpleasant, to say the least, and it was to relieve these that I began to look for some modification either of my method of operating or in the after-treatment; and as the latter seemed the easier upon which to experiment, I chose it and continued to perform the operation as I have done for the past few years.

I had frequently noticed a good deal of reaction along the pillars in the fossæ, and occasional edema of the uvula; with these conditions was associated great soreness in the throat, difficulty in swallowing and impaired speech.

There was a heavy fibrous exudate in the tonsillar fossæ which persisted for from four to seven days. I noticed that when this was removed with peroxid and then a five per cent solution of silver applied, the pain in swallowing was much less, and it struck me if that fibrous crust could be prevented from forming, we could avoid some of these difficulties. This brought the question, what was the cause of the reaction, the edema and the exudate?

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*Read before the Chicago Laryngological and Otological Society, April 20, 1915.

I think we must call it an infection. True, our instruments are sterilized, and we work under antiseptic precautions, but we know that at no time is the mouth free from bacteria.

I am informed by a prominent bacteriologist that there are ten varieties of actively pathogenic and seven of potentially pathogenic bacteria found in the mouth.

As soon as the tonsil is removed we have an open surface for their invasion, and one where, through trauma, the most favorable conditions for their development are presented. If this surface is treated with a strong antiseptic, the infection is greatly lessened, or in some cases altogether prevented. Acting on this theory, we began applying a fifty per cent solution of tincture of iodin to the fossæ immediately after the removal of the tonsil. The result fully justified our action, for none of the symptoms above mentioned were present. We did notice, however, that the membranes appeared to have been treated with an acid, so in the next case the solution was reduced to twenty-five per cent, and this we have continued to use.

The discomfiture has been reduced to a minimum, the great majority of the patients eating without complaint.

In only one case have I seen any edema of the uvula, and I am inclined to ascribe this to an infection which we did not control—possibly through injury to the venous system in that locality.

It may be argued that this exudate is the normal pouring out of lymph as we see after an injury on the surface of the body, and that probably in a measure is true, but why should it be reduced to a minimum and in many cases fail altogether following the use of the iodin?

I have seen cases where on the next day there was some exudate and some soreness, but cleaning this out and applying the iodin again has usually given the desired relief.

I believe that here, as elsewhere, it is easier to prevent an infection than it is to cure one, and for that reason before the patient leaves the table, after retracting the pillars so as to give an unobstructed view to every part of the fossa, the iodin is carefully applied to the entire surface.

We have treated over one hundred cases in this manner, and in only one case has it seemed to have no effect, and the same soreness, etc., occurred that we used to find before employing this method.

In order to convince ourselves that the tonsillar fossa was less aseptic after the iodin treatment, a series of cases was given this treatment and bacteriologic examinations made before and after operation. Four cases were selected on each operating day, and cultures were made of these throats. At the operation two would receive this treatment and two would not. The next day cultures were again made of the four throats.

The universal finding was that there was less bacterial growth in the cases in which the iodin and alcohol had been used.

Of course, it is necessary that all hemorrhage be controlled before applying the iodin, or it will simply be washed away and no effect produced by it.

It is our custom to have ready a tampon about the size of the tonsil saturated with alcohol. Immediately on removal of the tonsil this replaces it in the fossa and pressure is made for a couple of minutes. This usually prevents the hemorrhage. Where it does not, the pillar is retracted and the bleeding point grasped with a hemostat. The fossa is then painted with the iodin solution, and the same carried onto the pillars and uvula.

As a rule there is almost no soreness the next day, but where any is present, the same solution is applied.

Of course, by far the greater number of our patients have been children, but we have had a fair proportion of adults, so we are in a position to state the result is at least as good in these latter as in the cases of children.

SOCIETY PROCEEDINGS.

ABSTRACT OF THE REPORT OF THE SCIENTIFIC PROCEEDINGS OF THE THIRTY-SEVENTH ANNUAL CONGRESS OF THE AMERICAN LARYNGOLOGICAL ASSOCIATION.

Held in Niagara Falls, Canada, June 1, 2, 3, 1915.

Emil Mayer, M. D., Abstract Editor,

New York.

The president, Dr. Alexander W. MacCoy, of Philadelphia, in a felicitous address of historic interest, welcomed the members to the thirty-seventh Congress.

Papilloma of the Larynx.

By Thomas Hubbard, M. D.,

Toledo.

Cases presenting complications and describing special features of surgery and general treatment were reported.

The first case was like a papilloma, but was diagnosed microscopically to be an epithelioma. Two tumors removed at different periods were pronounced malignant. The treatment was removal by forceps, followed by cauterization, made thorough by means of a fenestrated intubation tube whereby the crystals of trichloracetic were rubbed into the base without injury to the sound mucosa. No recurrence up to now, about twelve years.

A case presenting asthma as a complication was reported. The larynx was the source of the reflex which excited bronchial spasm of the most severe type, uncontrolled by morphin and adrenalin, and making operative procedures extremely difficult.

Two cases of papilloma in children were reported. Both had emergency tracheotomy. Operations by direct laryngoscopy and curettement through tube and also through the tracheotomy wound were successful. One case required a second operation in less than a year, the removal of one large papillomatous tumor giving her complete restoration of voice and no recurrence for now a year. The other case, a boy of four, was cured in one curettement by upper and lower route. No recurrence in three years.

Papilloma of the larynx in an adult, operated thoroughly about six times in one year with active recurrence each time, was finally brought to a successful issue permanently by the aid of neck massage. This was begun one month prior to final operation, and it seemed to the operator that the operation was made more easy in that the patient controlled the larynx better than formerly. Massage was continued after removal of many small papilloma from all parts of the larynx except the interarytenoid space, and at this date, now six months, there is a perfectly clear larynx. It seems to the author that massage accomplishes precisely what is aimed at in the tracheotomy: the absolute rest method advocated by Clark and others, and in a much more rational physiologic manner. Normal nutrition is restored and normal functional activity is maintained. The author urges trial of massage in connection with timely operative procedures even in young children, in preference to tracheotomy and prolonged rest.

DISCUSSION.

DR. J. PAYSON CLARK, Boston: I wish to take exception to Dr. Hubbard's view with reference to tracheotomy in children. I cannot agree that leaving the tube in place for a long period hinders the restoration of function of the larynx. I have had patients who have worn the tube for a number of months, and after its removal there was no difficulty in the reestablishment of laryngeal function. It seems to me to be dangerous to remove the tube in children as long as there is any of the growth in the larynx, because there is apt to be an increase of this, and one may face the problem of doing another tracheotomy, which, as is well known, is more difficult than the primary tracheotomy.

I would also like to register a plea for the indirect method of laryngoscopic examination. With the invention of all the instruments for the direct view of the larynx there is great danger of neglect of the indirect method, which seems to me to be much better for adults.

Dr. E. Fletcher Ingals, Chicago: I would like to ask the reader of the paper about his results with trichloracetic acid. I cannot understand how it can be used in strong solution. Neither do I understand whether the tube, through which he did the cauterization, was removed immediately after the operation or later. If it was removed at once, was there no swelling or trouble in restoration of function afterward?

Dr. Clark says the second tracheotomy is more difficult than the first. I have not had much experience in this regard, but my recollection is that the second was the easier. I do not see why this should not be the case.

In curetting the growth from below, was it done on sight—could Dr. Hubbard see what he was doing? I would also like to know whether he used an interrupted stitch in suturing.

Dr. Allen B. Thrasher, Cincinnati: I have not seen cases of papilloma of the larynx very often in adults, because these intralaryngeal growths assume a different character; in children, however, they are very frequently encountered. In these cases one should never operate without telling the patient that the operation probably will have to be repeated. The larynx must be kept clear until the child is fifteen or sixteen years of age. There is always danger of recurrence while the larynx is small. I have kept a tracheotomy tube in for four years without any trouble. It was removed in the meantime, of course, but not left out entirely. In this case I could not see the patient regularly, as he lived one hundred and fifty miles up in the country, and was unable to make frequent visits to Cincinnati. This patient is now perfectly well, and has had no trouble since he was sixteen years old. He wore the tube constantly from his twelfth to his sixteenth year.

I have found tracheotomy more easily performed the second time than the first.

I am doubtful about the advisability of massage. It seems to me that it would increase the blood flow to the larynx, and this increased blood supply would be apt to stimulate growth. I have had no experience in this regard, but it does not appeal to me as being a scientific procedure. I believe the fact that Dr. Hubbard has not had trouble with his cases is due to accident. I would be afraid to try it in cases of papilloma. In other cases it may facilitate the return of the voice.

In cases of papilloma of the larynx, as in cases of warts elsewhere, I have used nitrate of silver. The mucous membrane of the larynx is much more easily destroyed than that of other parts, but nitrate of silver will not destroy it.

Dr. John F. Barnhill, Indianapolis: It has seemed to me, judging from my own experience, to be impossible, under certain circumstances, to get all the growth out, including the base of the mucous membrane. Dr. Lynch's method is largely in the open, and that is why it will prove successful. In all cases in which I have absolutely cured this class of disease, I have opened the larynx thoroughly and have seen that I actually removed all of the growth. Laryngofissure is not satisfactory in all cases. To open the larynx, to see what is there, and to thoroughly remove it under antiseptic precautions, is a plain surgical procedure, and, with proper closure of the wound, is, it seems to me, the best method.

Dr. Harmon Smith, New York City: A few days ago I had the opportunity of seeing Dr. Lynch operate on a papilloma of the larynx in a boy fifteen years of age. The larynx had been thoroughly cleared out by another laryngologist. The growth recurred. For a number of years the patient wore a tracheotomy tube, with no particular effect on the growth. He finally fell into my hands, and I used fulguration. Then another used radium. The growth would disappear partially and then recur. There had remained a fibropapillomatous mass in the anterior commissure, in the subglottic space. Dr. Lynch operated, curetting out this fibropapillomatous mass thoroughly. He could hold the cords aside and look underneath. I think Dr. Lynch has devised a surgical procedure for these cases.

Dr. Yankauer has invented a method by which fulguration may be used and oxygen sent in in a current; but there is not the deep burning that is necessary for the removal of these deep growths. Fulguration will certainly take off the skin, but that is not sufficient.

There is a difference in the infectivity of these laryngeal warts. In studying a series of cases of warts in children I myself got warts on my hand. There is a great difference between the multiple laryngeal warts in children and those in adults. In adults it is much eaisier to get rid of them. Radium, in two or three applications, will remove them in adults, but not in children. We do not know the true pathology of these papillomata. If we destroy the mucous membrane at the base and remove the blood, we may be reasonably sure that the growth will not recur.

Dr. Lewis A. Coffin, New York City: In the clinic I feel hopeless when I see a lot of children with papilloma of the larynx. We have records, however, of cases in children of removal by radium with no recurrence. A case was successfully treated by Dr. Abbe. Another case was that of a woman, forty-three to forty-five years of age, a singer, who was treated by two aplications of radium, lasting from one-half to three-quarters of an hour, with the disappearance of every vestige of the growth. There has been no recurrence for more than three years. I have now under my care a man from whose larynx I removed growths by the direct method. I treated him with applications of monochloracetic acid, but the larynx filled up completely. One year ago, when he phonated, the larynx was entirely filled with the growths on the arytenoids and in the anterior commissure. Dr. Abbe sent me one hundred milligrams of radium in a tube; this was applied to the growths, and in forty-eight hours they were entirely gone. After the removal of the growth on the epiglottis and the one on the arytenoid had grown smaller, I could see the large growth on the anterior commissure. Another application of radium was made to this for an hour. Five days ago when I saw the man I found the growths had simply withered up. There is still a small growth on the arytenoid and a ridge on the epiglottis.

Dr. Emil Mayer, New York City: I would like to hear the views of the members regarding the etiologic factors concerned in these growths. I have had two cases in adults working in tunnels and breathing compressed air. It seems rather rational that such a thing might occur. Removal by the indirect method has also resulted in the complete disappearance of the growths. If tracheotomy is employed, the tube must be carried for quite a number of years. I have had a case which is illuminating in this connection, and which shows that there is danger after tracheotomy. A little child had so large a papilloma in the larynx that tracheotomy was necessary. While I was cleaning the tube and putting it back again the child nearly passed away. After that I had two tubes, and as soon as one was out the other was put in, and in that way managed very well. The child lived quite a distance from me. One day while at play the child grasped the tape attached to the tracheotomy tube and pulled it out, gave one cough, and, before help could come, died.

DR. D. CROSBY GREENE, JR., Boston: Recurrence followed in a case in which I operated, and the patient went to another laryngologist, who removed the growth by thorough thyrotomy under direct vision. Six months later I saw the patient again, and the larynx was entirely filled with papillomatous tissue. Dr. Lynch's method will not be sufficient unless the immunity of the patient has been established. Within the past six months I have seen a case in which the patient presented warts on the skin simultaneously with papillomata of the larynx. Removal of the papillomata in the larynx was followed, within a short time, by disappearance of the warts on the skin.

DR. HENRY L. SWAIN, New Haven: Many years ago I had under my care two cases of papilloma of the larynx, one in a boy, the other in a woman thirty or more years of age. The boy was intractable and passed out of my hands. Nine years afterward he coughed up the remains of his papilloma. I have seen him within the last two years, and he has no growth at all. If he had staid with me his single papilloma would probably have become multiple. The woman was treated in various ways. I cauterized with pure nitrate of silver and with electricity; I curetted, and rubbed in lactic acid, and despite all this the papilloma returned. Some time ago Dr. Sperry called me in to see a patient, thinking laryngotomy was necessary. I found my old patient, the woman, with several papillomata. She had coughed off one growth, but the others had remained the same for some years. There was never any obstruction in her case. Whether they will become malignant, of course I do not know. In another case I have used alcohol sprayed on the surface of the papilloma, and have certainly prevented the necessity of instrumentation. I have done nothing else in this case, and the larynx is now entirely free. The growths have reappeared four different times, but for ten years I have done nothing but spray the surface with alcohol. This case is subject to the criticism that the growths might have disappeared if left alone, but I hardly think that true, as they disappeared so quickly under the treatment. At one time there were five distinct papillomata in this case.

Dr. William E. Casselberry, Chicago: In the glamour of the new we are apt to forget the merits of the old. No one has mentioned the old galvanocautery. At the last congress in Washington I presented a cautery which I devised, and which I have been using ever since. I cannot understand why fulguration possesses any advantage over galvanocautery. After removal of the growth with the forceps, by either the direct or the indirect method—and I have sometimes used both in the same patient—and after curetting (and I have never been able to curette satisfactorily in my own mind, always feeling that I have left shreds), the cauterization of the base with the galvanocautery is desirable. It is the easiest and most convenient method.

Dr. Harris P. Mosher, Boston: Did I understand Dr. Hubbard to say that the tracheotomy tube worn for any length of time interferes with the return of the voice? I have not found that to be the case. This particular part of his theory, while very pretty, is not borne out by the facts.

Dr. James E. Logan, Kansas City: I have had the very best results after curettement. Within the past two years I have had two cases of special interest. In one case there was a suspicion of carcinoma. I removed the growth a number of times, large pieces of what appeared to be fibrous tissue being taken out, and followed this with curettement. There has been no return. Another case was that of a woman, sixty years of age, the mother of nine children. A few years ago she had every evidence of carcinoma. After removing as much as I could of the growth I used the galvanocautery to remove the rest. Today she has as good voice as ever. In another patient, forty years of age, I have prevented recurrence for seven years by the use of the galvanocautery. Fulguration cannot be localized as can cauterization with the electrodes, suggested by Dr. Casselberry.

Dr. Robert Clyde Lynch, New Orleans: My experience with papilloma of the larynx covers sixteen cases. I will give briefly the histories of two or three, which will illustrate the results obtained with the method which I have devised.

The first case was referred to me by Dr. Jackson, by whom the patient, a woman, had been treated for two years. He had reoperated every month or six weeks for recurrence of papilloma of the larynx. The patient then removed to my neighborhood. I attempted to operate, as Dr. Jackson had done, with his forceps and other instruments. The method in my hands was entirely unsuccessful. At that time I began to use the suspension apparatus. The patient was anesthetized, and I carefully dissected out every portion of the growth which could be seen, both above and below the vocal cords and around the epiglottis. I cleared the area entirely. I suspected that I would have a good deal of postoperative edema, and kept the patient in the hospital for several weeks. Healing was perfect. That was a little more than two years ago, and there has been absolutely no recurrence since that operation.

The second case was that of a little boy, reported last year. The patient came into the hospital very much cyanosed, and the fright of coming into the clinic practically stopped his respiration. Tracheotomy was performed and the tube left in place. I thought that would be sufficient to clear up the papilloma, but it had no effect. I operated nine times by the direct method, clearing out each time as much of the growth as I could see. Each time the papilloma recurred. Then I attempted thyrotomy. With the tube in place I opened the thyroid. The child was two years old, and this was very difficult. I was not successful in cleaning out the larynx entirely, and in the course of three weeks it was again filled with papilloma. I left the child alone for six months, with the tracheotomy tube in place. In the meantime I was trying to learn some new method for dealing with such cases. Finally I suspended him, and dissected out the growths as far down as the end of the tracheotomy tube. That was two years ago, and I saw the patient just before I left home. There was no recurrence. I took out the tube twenty-four hours after doing this dissection. It was the first time in two years that the child had been without it. He had some voice at the end of twenty-four hours, and in two weeks his voice was as good as ever.

The third case was that of a negro woman. I dissected out the papilloma in the same way, and she returned home. She was very religious, had attacks of "hysteria," when she "shouted" and sang, as the negroes do in their meetings, and at the end of six months she came back with papilloma of the larynx. All my operative work in this case had been devoted to the region above the vocal cords. I thought this the first case in which I would have to report recurrence after operating with suspension. In looking over my records, however, I found that our previous efforts had been confined to the region above the cords, whereas the present papilloma was below the cords. This was dissected out, and there has been no recurrence.

It is impossible to remove papillomata completely by any method of punching or pinching or biting, using the forceps in one hand and some other instrument in the other. It is for this reason, I think, that we have so much recurrence. In the sixteen cases in which I have operated by dissection with suspension there has been no recurrence up to the present time.

Dr. Hubbard, closing the discussion: I think Dr. Lynch has devised the most surgical and precise method of dealing with these growths. All, however, have not the apparatus for this particular work, and so there is a field for the older procedures. I have found it a very useful procedure to put interrupted stitches in the tracheal ring. One must have a free field, snipping off, if necessary, all the isthmus which obscures the view. I usually take up the trachea and put in silkworm gut, about one-third back, through the ring in a child. In other words, I want it as firm as possible. The suture is placed between the cellular tissue and the tracheal ring, one stitch on either side, drawn together, and the ends left long. The ends are brought out on the neck and fixed with adhesive plaster. One can then pull on these and draw the trachea and the larynx forward, getting a glimpse of the lower end of the larynx. Otherwise the curetting is done blindly. Thorough curettage of the larynx can be accomplished by this method with curettes of various sizes and angles. If the papillomata are "ripe" they can be gotten out at the base; those that are in a state of active growth cannot be entirely removed. I always inspect the growth from above prior to curettement.

In using the trichloracetic acid I simply moisten a small swab, smear with the crystals, and go over the surface with this. The tube is fenestrated, it is inserted in the larynx, and is left there.

I want to call attention again to massage as a factor in producing the condition which brings about the restoration of the normal processes of the larynx. Any simple method like massage is superior to the absolute rest of the larynx induced by the prolonged wearing of the tracheotomy tube.

Some Statistic Observations on Oto-Laryngologic Diseases Among Negroes, Based on Fifteen Hundred Cases.

By Dunbar Roy, M. D.,

Atlanta.

It is surprising how few negroes present themselves for nasal diseases. Out of the total fifteen hundred, only three hundred and forty-one came for nasal complaints. Spurs and deviations are very rare. The writer has never seen a deviated septum in a full-blooded negro. In the writer's opinion, this is due to two causes. In the development of the maxillary bones you never see a contracted and high arched palate among negroes. This tends to substantiate Mosher's argument as to the importance of the premaxillary ridge in the causation of septum deviations.

2. Traumatism as a causal factor is rare because of the protruding brow and soft resilient cartilages externally. Acute inflammation of the accessory sinuses was exceedingly rare, due, in the writer's opinion, to the free ventilation in the nasal cavities. Only chronic necrosing ethmoiditis with polypi occurred more frequently than other chronic sinus diseases. Hay fever occurred in only two cases, and did not differ in symptoms from that seen in the white race. Atrophic rhinitis was seen in one case only, which would seem to disprove that theory making large nasal passages a predisposing cause for this condition. No case of chronic maxillary abscess was seen. It is a well-known fact that few negroes have bad teeth. Syphilitic lesions were frequent, as also purulent rhinitis in the young, which readily yielded to antisyphilitic treatment of the old regime—i. e., mercury and iodid of potassium.

3. Pharynx, epipharynx and larynx. There were one hundred and six cases involving these parts, by far the largest

percentage. Diphtheria is exceedingly rare in spite of the poor hygienic surroundings of many of these people. Laryngeal tuberculosis occurred only twenty-three times. Laryngeal and pharyngeal syphilis, two hundred and seventy. Adenoids and enlarged faucial tonsils occurred two hundred and ninety-six times, which refutes the statement made several years ago that adenoids are very infrequent among the negroes.

DISCUSSION.

Dr. Charles W. Richardson, Washington: In the main my observation is in accord with Dr. Roy's, but this is not the case with regard to the apparent immunity of the negro to diphtheria. For a number of years I had charge of the diphtheria ward in the Government Hospital in Washington, which was, in fact, the municipal diphtheria ward. There were practically no negroes in it. I do not remember a case of laryngeal diphtheria in any of the wards. I never intubated a negro child in my whole experience.

My experience is not in accord with Dr. Roy's with regard to the presence of adenoids and enlarged faucial tonsils in negro children. I think some of the worst cases of adenoids I have ever seen and operated on have been in negro children. Some years ago I was inclined to believe that negroes do not have this condition, but latterly, probably in consequence of school inspection, they come into the clinics in great numbers.

Syphilis among negroes is quite general in Washington as well as in Atlanta.

True Myxoma of the Rhinopharynx—Report of Two Cases.

By Virginius Dabney, M. D.,

Washington, D. C.

Extreme rarity of true myxoma anywhere in the body, but especially in the rhinopharynx, leads to report of two cases. Some pathologists reject entirely the term, believing no such pure tumor exists. However, sections show absolute absence of any fibrous elements.

Case 1.—Tumor seen on drawing forward soft palate. Under ether, large adenoid curette fitted over growth which was removed from attachment to the basilar process. No recurrence after ten months.

Case 2.—Two growths found at operation. Only one could be seen at examination; smaller attached to basilar process, larger to posterior ethmoid. Both were divulsed with large adenoid forceps. Patient had had similar growth removed eleven years before. Photographs of growths and of microscopic sections were given.

DISCUSSION.

Dr. Harmon Smith, New York City: This must be the exception which proves the rule. It has been definitely stated by many histologists and pathologists that true myxomata do not occur in this region. In the majority of instances myxoma has sprung from the ethmoid or somewhere else; mixed fibroma and myxoma, on the other hand, arise in the nasopharynx. So far as I know, there has been no other case reported of true myxoma springing from this region.

Dr. James E. Logan, Kansas City: I would like to ask the nationality of these patients, especially the one with the very large growth. It often happens that these growths appear in individuals of certain nationalities. Those of Scandinavian birth are more apt to have them than any other class of patients. I have had two pathologists at variance on two cases, one operated by myself and the other by Dr. Fenger. One pathologist said there was every evidence of myxoma, the other, that it was fibroid or myxofibroma. The tumor in one case, a boy of Swedish nationality, was attached to the basilar process.

Dr. Dabney, closing the discussion: One patient was German, the other American. What Dr. Smith says about the origin of these growths is the excuse for this report. They are supposed never to occur. I had the specimens examined by very skilled pathologists in Washington, at Howard University—a school for colored students, having very excellent pathologists—and also at the government school. They are true myxoma. I have looked up the literature, and there are no other cases reported of true myxoma of the rhinopharynx.

The Surgical Anatomy of the Socalled Capsule of the Faucial Tonsil.

By G. Hudson Makuen, M. D.,

Philadelphia.

The socalled capsule of the faucial tonsil is not a capsule at all, in a strict sense of the term, and it consists, in part at least, of that portion of the intrapharyngeal aponeurosis in a recess of which the tonsil attaches itself during the course of its development.

The intrapharyngeal aponeurosis is a broad membrane having its attachment above to the base of the skull, and extending downward it not only separates the tonsil and the palatal pillars from the superior constrictor muscle and other important tissues in the cervical region, but folds of this membrane protrude themselves between the tonsil and the pillars of the palate, and the anterior fold when it protrudes itself well in front of and below the tonsil constitutes what is known as the plica triangularis or plica tonsillaris.

In the course of its development in embryo and during infancy, the tonsil appears to appropriate a portion of the connective and musculofibrous tissue with which it is in juxtaposition, and finally in adult life it becomes firmly attached to this membrane to which has been given the name intrapharyngeal aponeurosis, and a portion of which seems to constitute the socalled capsule of the tonsil.

As usually performed, therefore, a complete extracapsular tonsillectomy must leave a window resection of the intrapharyngeal aponeurosis, not only exposing the palatal pillars and the superior constrictor muscle, but opening up avenues of infection in the deeper regions of the neck.

A more desirable operation, which may be called an intracapsular tonsillectomy, or better still, an intercapsular tonsillectomy, is one in which the tonsil is removed with only the thin innermost layer of the capsule, the major portion of it being left in the pharynx as a complete lining for the fossa, where it serves as a strong wall of defense against infection in this region. This intra- or intercapsular tonsillectomy may usually be done easily and accurately with an ordinary snare in connection with the Sluder tonsillotome, and sharp cutting instruments are not required except in those rare instances where pathologic adhesions have formed between the tonsil and the mucous membrane covering the adjacent pillars.

DISCUSSION.

Dr. William E. Casselberry, Chicago: I am very glad to have heard this definition of terms. I have been doing the same operation that Dr. Makuen has been doing, but whereas he called it the intracapsular method, I have been calling it the extracapsular method. I still object to his term intracapsular for either his way or mine. Intercapsular would be a better term than intracapsular, it seems to me. Whether the capsule develops from the aponeurosis or from the tonsil itself matters not. I would not, in either event, forget the word capsule, for surely, as we see it, it is a capsule of the tonsil. The tonsil is enveloped in a smooth membrane which can be separated from the major portion of the aponeurosis. The smooth dissection of the capsule from the major portion of the aponeurosis is, I believe, the best operation. It results in no distortion of the pharynx. In the majority of instances it is unnecessary to cut much of the plica or mucous covering of the pillar itself. Cutting the covering of the pillar is one of the things which results in infection and distortion. I, too, have been struck by the difference in the thickness of the capsule. Sometimes, when I have exposed a piece of muscle, I have thought I have gone too far, and when I have tried to get only a thin portion, I have gotten a thicker portion.

Dr. J. Gordon Wilson, Chicago: If the surgical anatomy of the tonsil is different from the anatomy, I miss Dr. Makuen's point. I cannot understand how he can call the part of the covering of the tonsil which comes from the aponeurosis of the muscle a part of the capsule of the tonsil. Poire illustrated that in his textbook. That part is not capsule of the tonsil. The capsule of the tonsil normally is very thin, as may be seen when it is sectioned. It is separated from the other tonsillar tissue by a thin layer of areolar tissue. Toldt's anatomy gives the best description of this. The crypts go right down to this connective tissue sheath. As age increases this sheath thickens; it is also thickened by inflammation.

Dr. George E. Shambaugh, Chicago: I cannot follow Dr. Makuen in tracing the thickness of the capsule of the tonsil. As I understand it, this thickness increases with age, and the tonsil becomes more and more adherent with age, according to Dr. Makuen's idea. In my experience, this is not the case. I have taken out the tonsil in people of seventy, in whom it is as loosely adherent as in infancy. If there is adherency, it is because there has been a great deal of inflammation, and not because of the physiologic character of the tissue.

Dr. Henry L. Swain, New Haven: I have obtained a good deal better idea of what the capsule really means by studying the lingual tonsil than by studying the capsule of the faucial tonsil, especially by studying the follicles, which heap themselves up around the tonsil. The follicles, accumulating around the tonsil, make a complete limiting membrane. If this is taken out it forms an impression or mould in which the tonsil lies. The larger the tonsil the thinner the capsule, and the smaller the tonsil the thicker the capsule. If the tonsil is dissected out in the cadaver, it is found that there is, in a child, a very slight line of demarcation where the covering membrane of the tonsil ends and the posterior pharyngeal wall membrane begins. Young children have very little line of demarcation between the connective tissue on which the tonsil rests and the posterior layer of aponeurosis.

Dr. John F. Barnhill, Indianapolis: Dr. Makuen spoke of splitting the capsule. I could not understand that at the time, but having studied the tonsils which I saved, I can now see how one might speak of splitting the capsule, or, rather, the tissues around it which are removed with the tonsil. I have brought along a large number of these tonsils, which demonstrate, I think, that there is an external capsule which is connected with the deep tissues of the neck, and another which has nothing at all to do with this.

One of the tonsils in this collection, by the way, shows a portion of the styloid process.

Dr. Lewis A. Coffin, New York City: My conception of the tonsil with its capsule is about that of a tangerine with its peel. The outside skin of the tangerine can be easily removed, without the fibrous covering just over the pulpy part of the tangerine, which is connected with the interfibrillar tissue of the fruit. This fibrous covering, to my mind, is the capsule of the fruit, and not the outside rind. So it is with the tonsil.

If there is repeated inflammation, there will be thickening of the outer capsule.

DR. GREENFIELD SLUDER, St. Louis: I have listened especially for one point which has not been cleared up in the discussion. I have been very much interested in this subject for three or four years, and feel very much gratified that Dr. Makuen should have used the principle of picking up the tonsil, to which I called attention before the laryngological section of the American Medical Association in 1910. The technic was not original with me; it is the technic of Physick, published in 1827. It has been strengthened, but not changed. The point to which I referred, which has not been made clear, is the capsule splitting process. Is there a delimiting membrane which bears the crypts at one end? Is there a fibrous delimiting membrane which covers the posterior constrictor and pillars, or is the crypt open on its lateral aspect, or is it closed by the envelope? (Dr. Makuen answered that it is closed by a very thin membrane.) If that were uniformly the case, this technic would be the ideal method of tonsillectomy; if it be not the case, the turning of the blade across does not remove the last cell of lymphoid tissue. If it does not remove the last cell of lymphoid tissue, it is not a success, because the activity of this lymphoid tissue will bring about a recurrence of the condition for which the operation was performed. Lymphoid tissue will grow up into the wound from the lingual tonsil, developing all the clinical symptoms which the case presented originally. I have seen that happen.

DR. MAKUEN, closing the discussion: Dr. Casselberry has referred to terms and definitions of terms. I used the term intracapsular tonsillectomy chiefly because no distinction has been made between what Dr. Wilson has called the true capsule—and which we all recognize as the true capsule—namely, the thin membrane, and the posterior aponeurosis to which the tonsil becomes so closely attached. The English and French schools of anatomists did not distinguish between these two structures. I use the term intracapsular tonsillectomy because no distinction has been made between the true capsule and this membrane to which it is so closely attached at times that it seems to be a part of the capsule itself. I have found that after mutilation of the tonsils this section of intrapharyngeal aponeurosis is taken out with the tonsil, and it has been called extracapsular tonsillectomy, where all the capsule has been removed. I object to a sharp instrument because it is so easy to go through this membrane. When you cut through this intrapharyngeal aponeurosis and get the finger down into the loose tissue between that and the muscle, you simply have to tear things out. That is why the finger dissection so rapidly went into disrepute. The finger nail made tears in the muscle which caused great contraction. We all do the same operation and try to get the same results, but the fact remains that we do get deformities in many instances. Someone in New York reported one hundred dissections with eighty per cent of deformities of the palate. We do not all do the beautiful operations which some do, and unless we are very careful we will get these unfortunate results. That is why I have suggested the technic detailed in this paper.

Leucoplakia Buccalis and Lingualis.

By Robert Levy, M. D.,

Denver.

This paper is intended to review the bibliography from 1902 to the present time and to offer a critical analysis of opposing views.

The author presents a case as a text. The patient had been under his observation continuously for seven years, during which time the case passed through the various changes incident to leucoplakia. Large papillomatous masses developed and a diagnosis of carcinoma was at one time made, resulting in the extirpation of the lower jaw. Subsequent papilloma and leucoplakia again occurring, doubt was thrown upon the diagnosis of malignancy.

Microphotographs showing the development of papilloma as well as the histology of leucoplakia are presented. The author discusses names, definitions and varieties, etiology, pathology, the frequency of cancer; pathologic manifestations indicating the development of carcinoma, clinical manifestations indicating cancer and treatment.

The author arrives at the following conclusions:

1. Leucoplakia is of special interest because of its doubtful etiology and because of the dispute regarding the question of degeneration into epithelioma.

2. The case reported shows the uncertainty of the diagnosis of malignancy. The most definite clinical appearance cannot always be relied upon.

3. Leucoplakia is a generic term. Excluding syphilitic lesions, it may be considered a pathologic entity.

4. The views of writers who attempt to show the degeneration into cancer are not tenable in the light of our present understanding of the genesis of cancer. Degeneration of existing cells into cancer cells does not take place. A cancer is such from the beginning, and is not caused, only influenced in its development, by irritative lesions.

5. Our understanding of leucoplakia has been confused by attempts to describe a "precancerous stage" or to establish the theory of its "degeneration" into a malignant growth. Leucoplakia may, however, be looked upon as a warning.

6. Certain clinical manifestations may arise which, though not positive, are sufficient to arouse the suspicion of malignancy.

7. The results of treatment are unsatisfactory. Fulguration offers considerable encouragement.

DISCUSSION.

Dr. John F. Barnhill, Indianapolis: During the past year I have had one case of this nature. The patient, a woman thirty-two years of age, had formerly lived in Indiana, but because of tuberculosis had moved to Florida, where she had been living for four or five years When she came to consult me she had this condition, as diagnosed by a number of physicians, pathologists, bacteriologists, general practitioners and laryngologists. She also had tonsillitis. She would not allow operation because of the tuberculosis. She had been treated by means of X-rays, washes, etc. The mouth got absolutely well, and the patient is much better generally.

Dr. Thomas Hubbard, Toledo: I have had three cases of this kind. I had a good deal of difficulty in establishing the diagnosis between this and pemphigus. In one case the patient had pemphigus, but the lesions in the throat were not typical pemphigus lesions, and had the case not gone on to typical pemphigus of the skin, the diagnosis would not have been cleared up. In another case this condition occurred in a man who had syphilis. He was a heavy smoker. The third patient was also a heavy smoker. He smoked from twenty to thirty cigars a day. After one week's cessation of smoking there was a complete disappearance of the lesion. These were typical leucoplakia lesions.

DR. E. FLETCHER INGALS, Chicago: About thirty years ago I reported a case of leucoplakia treated with the cautery, with cure. The lesion was not more than a centimeter in diameter.

DR. EMIL MAYER, New York City: I think leucoplakia is practically always the forerunner of malignant disease. I have under my observation at the present time a patient who, fifteen years ago, showed the first signs of leucoplakia. Within the year he has developed epithelioma. I have seen a number of such cases.

DR. CHARLES W. RICHARDSON, Washington: The cases which I have seen have usually been so extensive that any of the operative measures suggested here or elsewhere would be entirely out of place. In the last case which I had, not only the whole dorsal surface of the tongue, but the buccal cavity as well, was involved. The man had the most intense pain. He has since died. In all probability it would have developed into malignant disease. In some of the cases the dorsum of the tongue, the surface of the hard palate, the under surface of the tongue, and the buccal walls were involved.

DR. D. BRYSON DELAVAN, New York City: Most of the cases which I have seen have become malignant. Any irritative course of treatment is particularly contraindicated. Elimination of the source of irritation, as in tobacco smoking, will result in improvement. In view of the malignant tendency of this condition, it would seem that radium would offer advantages not likely to be realized by the older forms of treatment. Some cases have been subjected to this treatment and have improved under it. I do not know of a case, however—the matter being a recent one—in which a cure is said to have been effected.

DR. LEVY, closing the discussion: The case cited by Dr. Barnhill, of tuberculosis, might have been a case of leucoplakia suffering with tuberculosis. I have never seen a case of leucoplakia caused by tuberculosis, nor do I see how this could be determined. If it were due to tuberculosis, it was certainly remarkable. The fact that it got well is evidence that it was not leucoplakia. Various other skin diseases have been mentioned in this connection. Dr. Ingals went over the subject very thoroughly in his paper, which was one of the most satisfactory papers ever written concerning this condition.

The question of leucoplakia always terminating in cancer is of course an important one. In the full text of the paper will be found many views pro and con.

The case I reported is an unusual one in view of the extent of the lesion. Other cases quite as extensive have not developed malignancy. It is not necessary for the case to terminate in cancer. The lower jaw, the parotid gland, and the surrounding structures were all removed, yet it was not cancer, as proved by the subsequent history of the case. If we wait long enough we may find cancer developing in the patient who had leucoplakia. Given a case of leucoplakia, however, it is not necessary that it will terminate in cancer. In cancer cases, undoubtedly, it is often possible, by going back far enough, sometimes as far as forty years, to find that the patient had leucoplakia. While cancer may be antedated by leucoplakia in many instances, it is not proved that all cases of leucoplakia will terminate in cancer. Leucoplakia of the tongue is reported by some writers as being more likely than that of other localities to terminate in cancer.

Hyperplastic Sphenoiditis and Its Clinical Relations to the Second, Third, Fourth, Fifth, Sixth and Vidian Nerves and Nasal Ganglion.

By Greenfield Sluder, M. D.,

St. Louis.

The writer spoke of the body of the sphenoid independent of what cell occupied it, and mentioned the close relations of the above enumerated nerve trunks to its bony wall, and that the size of the cavernous sinus rather than that of the sphenoid cell was what determined some of those relationships. He spoke of the striking difference, clinically, between the nerves in the canals—maxillary and mandibular branches of the fifth and Vidian compared to the third, fourth and sixth, which run through the wide gap of the sphenoidal fissure, the former being a clinical question infinitely more often than the latter. The diagnosis was made from bone removed from the anterior part of the sphenoid sinus of one hundred and fifty-six cases by Dr. Jonathan Wright, whose microscopic findings corresponded almost uniformly with cases clinically. The slow growing bone increase had for its clinical history long-standing pain and often very slow progressive loss of vision, sometimes only a segment of the optic nerve being involved, the cases of violent headache and rapid loss of vision showing acute ostitis engrafted on the chronic process. The bone sometimes showed periostitis, and sometimes the mucous membrane was normal. The argument was that the clinical picture in the chronic cases arose from narrowing of the bony canals in the process of the hyperplastic bone changes, and that the optic nerve was thereby compressed in the optic canal, producing disc swelling with loss of vision. That the recurrent pain in the second division of the fifth and Vidian—usually diagnosticated migraine—was explained also by narrowing of their confines. In many of the cases these headaches preceded the optic nerve troubles by many years. He attempted to explain this on the score of drainage, the lower part of the sinus usually being bathed in a small amount of thin secretion, whereas the optic and the upper part was not so. He thought the hyperplastic lesion rendered the district more vulnerable, and cited that small areas here become inflamed from unrecognizable origin, and according to their position were more or less disastrous. In the upper outer anterior aspect of the sinus, loss of vision occurred; and in the lower outer and lower middle parts, great pain of maxillary and Vidian distribution, respectively. He raised the question, how lesions of this kind could be bettered by removal of bone for drainage. He did not believe that the primary blood letting of the surgery explained it, and cited a case in argument thereof. He stated that a similar lesion in the anterior nose, where very easily visible, was subject to recessions of longer and shorter duration, and that the condition was apparently helped by judicious surgery. The degree of hyperplasia of the plica septi seemed to be an index of the hyperplastic process in the sphenoid, whereas the degree of hyperplasia of the posterior tip of the middle turbinate seemed an index of a similar condition in the postethmoid.

He appended Dr. Wright's summary upon concluding the examination of the series of specimens.

Headaches Due to Nonsuppurative Intranasal Conditions.

By George C. Stout, M. D.,

Philadelphia.

Headaches of nasal origin, in which suppurative conditions are positively eliminated by macroscopic examination, transillumination, the X-ray, etc., have not occupied a prominent place in our literature heretofore. But, while these headaches are found in a relatively small per cent of the cases who consult the specialist, they are of sufficiently frequent occurrence, and severe enough in their result upon the nervous and mental condition and general health of the patients, to warrant their being considered as a group by themselves.

The pain varies from occasional attacks of moderate degree to frequent seizures of intense agony. It is commonly referred to an area back of a triangle formed by the glabella, the outer canthus of the eye, and the anterior nasal spine. It may also affect the teeth, the neighborhood of the eustachian tubes, or ears, sometimes extending down to the shoulder. It is usually unilateral, but may be bilateral, or occur on both sides alternately. It is not increased by the use of the eyes, though sharp, shooting pains through the eyes are often present. When the pain has existed for a long period the effect upon the patient is deplorable: his general health is undermined, and his mental condition profoundly depressed.

Owing to the very slight departure from normal of the rhinoscopic picture, these cases frequently pass through many skillful hands before the true cause of the pain is recognized. A thorough routine examination of the middle turbinate fossæ should, therefore, be made in all doubtful cases. All the more common causes of headache must be eliminated, such as neurasthenia, eye strain, febrile conditions, syphilis, malaria, digestive disturbances, rheumatism, etc. The absence of pus and the condition of the eye grounds should be ascertained. The general appearance of the lower portion of the nose may be normal, but upon further examination it will be found that, while the middle turbinate itself may be of normal size and coloring, its cavity is narrow and compressed either by the lesser upper (or counter) deviation of the septum, or by a bilateral thickening of the upper portion of the septum, or by a split septum due to injury. Careful exsanguination of the inferior turbinates and their immediate surroundings only should accurately determine the point of contact. The exsanguination alone may so relieve the existing headache as to prove the chief localizing factor of the cause of the pain.

Treatment should be directed to the middle turbinate itself, and should consist, first, in frequent applications of cocain, adrenalin and astringents; and, second, as a last resort, the extirpation of a part, or the whole, of the middle turbinate. While the good results of the local applications may be only temporary, the operative procedure usually effects a complete cure of the pain.

The operation may be done under local anesthesia in the phlegmatic patient, but in others the general anesthesia is advisable. As a rule, there is no free bleeding after the operation, and the dressing consists merely in some mild antiseptic powder. The after-treatment consists in keeping the nares wide open and the insufflation of calomel powder every second day.

DISCUSSION OF PAPERS BY DR. SLUDER AND DR. STOUT.

DR. CORNELIUS G. COAKLEY, New York City: I have been discouraged by the migraine type of cases described by Dr. Sluder. I have, however, seen numbers of these patients, sent by ophthalmologists, with varying conditions. In all cases there is a question whether there has been any disease in the posterior sphenoidal and ethmoidal sinuses. None of these cases present typical signs of suppurative disease. Radiographs show nothing, the sinuses always appearing perfectly normal. In most of these cases the ophthalmologist, and also the rhinologist, have gone through all the tests, excluding all the usual causes of the disease to be found in the eye. The statements which have come to me have usually been that the cause of the trouble cannot be found in the nose, and that the etiology cannot be determined. The majority are not likely to get better without some aid. I have probed the sphenoidal sinus—which can be comparatively easily done—and have examined that portion of the sphenoidal mucous membrane which can be reached with the probe, finding it relatively normal. At the request of the ophthalmologist I have removed the middle turbinate, made a large opening in the sphenoid, and have found normal membrane. I have been astonished at the improvement in most of these cases, although the vision has been bad for two to three weeks, followed by complete recovery.

I have tried to use the Holmes pharyngoscope as described by Dr. Sluder, but I do not see how he gets into the sphenoid so as to make the use of the Holmes pharyngoscope possible. I have been able to examine a little of the roof and floor, some of the posterior wall, and a little of the anterior surface. The great difficulty with all sphenoidal operations is that the orifice becomes very much contracted, so that in the course of six or eight weeks the opening is no larger than normal, and sometimes smaller. If the essayist will tell us how to make an opening that will remain, I will be obliged to him.

Referring to Dr. Stout's paper, I wish merely to say that pressure against the anterior wall does give rise to these symptoms.

DR. JOHN F. BARNHILL, Indianapolis: We see cases over and over, such as Dr. Stout describes, in which removal of the anterior turbinate relieves the condition. Removal of tissue in the nose with no clear indication for doing so is to be deprecated. The matter of diagnosis is of the greatest importance. X-ray and blood examinations should be made, but patients will often not allow it. My greatest source of information has been from the University clinic, where we have advantage of all the channels from which information comes. Sometimes when all the lines of investigation have been followed—X-ray, ophthalmologic, and blood examination —we find appendicitis. I recall three instances of that kind. We may take a line here from our friends, the surgeons, in the far northwest. Nose cases are going to them today, as well as all other classes of cases, because of the tremendous reputation they have for examining patients in every way with the one cost. When we examine them and have all the other examinations made it amounts to hundreds of dollars.

Very often the trouble is not in the nose at all.

DR. HANAU W. LOEB, St. Louis: The merit of Dr. Sluder's paper rests in the determining of trouble in the sphenoid cavity when no pus is present, and discovering the relation of this trouble to the cranial nerves. This is a good deal to find out in a few years.

Dr. Stout's paper is also important. There are two or three points which will establish the diagnosis in these headaches—headaches in which I operate upon the middle turbinate. They are uniform in character; they attack one side of the nose, one part of the head; they last a more or less definite number of hours, then disappear; they almost invariably appear in the morning and disappear in the evening. As a rule, I refuse to operate unless cocain relieves them, and unless there is some marked process present. It is sometimes the case that I am surprised to find the amount of pathologic process going on when there is no pus. Whether the cause is circulatory or not, I do not know. We have been able to do an immense amount of work in relieving the patient where the anterior turbinate is involved, but we have not been able to do much where the posterior sinus roots are involved. Dr. Sluder's work is important in this regard.

DR. GEORGE A. LELAND, Boston: Not the large amount of pressure, but the continuous pressure, explains some of these cases. This may be illustrated by pressing upon the skin of the hand. It requires only a short time to cause considerable pain, which may not be felt so long as the pressure is exerted, but which manifests itself as soon as the pressure is removed. We have the same condition in the nose. There is a certain amount of soft tissue covering the cartilage. I have seen cases in which a little spicule of bone, sticking out from the septum and pressing upon the second turbinate, will cause pain when, during menstruation, there is an increase of pressure, or when the patient eats too much or drinks too much; and with this increased pressure there is the headache which comes under similar conditions.

DR. WILLIAM E. CASSELBERRY, Chicago: I can confirm the observations of the essayists as to the total absence of pus at times. If pus in the quantity described by Dr. Coakley is considered as an indication of the presence or absence of suppurative sinuitis, I am in accord: but in other cases smaller amounts of pus may occur in one or another of the sinuses, not shown by X-ray examination. But, ad seriatim, taking the antrum, the sphenoid, the ethmoids, I have been able to discover an appreciable quantity of pus or mucopus, which amounts to the same thing. I am under the conviction that in most of these cases there is a suppurative condition which is at the bottom of the hyperplasia complained of.

Dr. James E. Logan, Kansas City: I recall one case, in which the headache came periodically in the morning, stopping in the evening. The young man suffered from very extreme headache, beginning about nine o'clock in the morning and stopping about four in the afternoon. He had been operated upon for removal of a portion of the middle turbinate. The headache persisted—nasofrontal headache. I removed the rest of the middle turbinate and opened the duct, thinking pus was there. Very little pus was found. The patient suffered continuously with the headache, which gradually came later in the morning and remained later in the afternoon. Finally, by suction, I got secretion from the nasofrontal duct. This was sent to the pathologist, and it took forty-eight hours to get a culture, which showed a very faint mixed infection, with staphylococcus aureus and streptococcus. An autogenous vaccine was made from this, three injections of which were given, and the patient got well. The same course was followed in another case, and the patient was given relief. Nothing else had given relief. Such cases would seem to indicate, as Dr. Casselberry has just suggested, that the pus is there and can be found if we look for it.

Dr. Emil Mayer, New York City: The amount of pus may be very small in these cases. I recall, in this connection, an experience at Mount Sinai Hospital. The patient, a young man, who had acromegaly, presented a history of persistent headaches. He had high temperature, muttering delirium, and choked disc, and as a result examination of his nose was exceedingly difficult and required skillful dodging. I succeeded, however, in getting a little pus, but said I thought very little could be done for him. The attending physician thought operation was all that could be done, and so I removed the anterior portion of the ethmoid. In twenty-four hours the headache and delirium had cleared up. Some of those in consultation thought I operated at a time when the man was in some sort of crisis. I do not think so. I introduced a probe into the sphenoid and had an X-ray taken. The result was a perfectly clear picture of the probe in the sphenoid, and all then agreed that I was right.

Dr. Otto T. Freer, Chicago: Even very extreme conditions, where there is a sharp crest or ridge very far back in the nose, so rarely cause headache that I have become very skeptical of pressure headaches in general. The whole question is one of reflex. Where we try to remove the effect by the use of cocain, we are just as much in the dark as we were before. This is, in fact, an open door for all sorts of experimental operations. The patient may be told that it is entirely experimental, the septum is resected, the patient is no better, and still he blames the doctor, no matter how plainly he has tried to impress that the operation is purely experimental.

I agree with Dr. Casselberry about concealed suppuration, but I wish he had been a little more specific as to his method of exploring the sinus. Exploring the sinus through the natural opening is not always satisfactory. I recall a case in which the thin roof of the antrum had been perforated by the canula, the injecting fluid injected into the orbit, and the eye put out. I do not regard washing out the antrum through the natural opening as an entirely safe procedure. The frontal sinus is still more difficult for diagnostic washing. It is sometimes by no means a trifle. In one case which I recall the patient fell over in a convulsion. The fluid could not get out through the small opening, and there was intracranial pressure. One thing that gives an indication of concealed infection is the complaint by the patient of a discharge running back into the throat. A perfectly healthy sphenoid and infundibular region usually does not go with diseased ethmoid. Something must be there to give us a hint. The nerve most often affected, in my experience, is the anterior ethmoidal, which is a very sensitive nerve, as Killian has shown.

Dr. Casselberry, continuing the discussion: In a recent issue of the *London Journal of Laryngology, Rhinology and Otology,* Kelly, of Glasgow, records no less than thirty cases of bad results from exploratory puncture by the penetration of the antrum. The one Dr. Freer mentions is the first I have heard of in an attempt to irrigate the antrum through the natural opening. When he puts in the canula and penetrates the orbital plate he is not irrigating through the natural opening. The canula with which I irrigate through the natural opening is very thin, reasonably thicker where I hold it, having more than a right angle turn at the bend, and not exceeding more than from one to two millimeters in length. Properly introduced, it will serve for the irrigation of the antrum through the natural opening, which can be accomplished safely in the majority of instances. The stopcocks must be arranged and the air pressure regulated. Not more than ten pounds pressure should be used to begin with, otherwise harm will be done. This is run up as the operation proceeds. The same thing is true of all the other sinuses.

Dr. J. Gordon Wilson, Chicago: Dr. Sluder's paper is extremely interesting and suggestive. It does not mean that there may not be disease of the sinuses without suppuration. That depends, of course, upon what we mean by without suppuration. There may be hyperplasia of any sinus without any suppuration at all. Some years ago I did some work in the way of putting capsules into the sinus, having introduced into these capsules different forms of bacteria. The capsules were so arranged that the bacteria would not come out, but their toxins would. There was hyperplasia in these cases. I used drugs for these experiments, some of which were kept alive for several weeks. I have often wondered how infection passes along these nerve trunks. I suggest, as quite possible, that there may be absorption of the toxins from the lymphatics into these nerve trunks.

Dr. Sluder, closing the discussion: Answering Dr. Coakley's question about the method of operating: The outlet and the sinus itself must be large enough to permit of the use of the pharyngoscope. I use a right-angled knife. The posterior part of the cribriform plate and the posterior and uppermost aspect of the olfactory plate are appoached, the sphenoid sinus or one of the misplaced ethmoidal cells being punctured by such a stroke. As soon as the cell is punctured the stroke is directed downward, forward, and inward. The septum is cut down to the floor of the sphenoid. The knife is then introduced carefully along the cribriform plate. Again the uppermost posterior aspect of the olfactory plate is approached. The knife is then turned at an angle of forty-five degrees, and downward and outward. This, on the cadaver, has been proved to throw the posterior ethmoidal labyrinth pretty thoroughly open every time. By means of the pharyngoscope it is found that there are two very satisfactory openings into the posterior ethmoidal cell, and sometimes the sphenoidal. Sometimes it is possible to get it all out in that way. Dr. Wright has one such specimen, measuring a half inch in diameter.

Dr. Coakley spoke of being unable to get good observation with the pharyngoscope. I always operate under cocain. I uniformly refuse to operate upon these patients except under cocain. I give them scopolamin first. The primary stroke is sufficient to produce enough shock, and at the same time to prevent the wound from bleeding. With the pharyngoscope close at hand it can be passed in. The patient may faint; let him faint. The wound for a time does not bleed.

I have some cases in which the opening staid open for five or six years. I have never seen membranous closure, as suggested by Dr. Bryan, but I have seen bony closure, as suggested by Dr. Coakley.

Dr. Loeb spoke of congestion in the sinus, which he thought more responsible than the vacuum of which I spoke. Politzerization will stop the trouble. The congestion is the result of the vacuum.

Dr. Leland has given a valuable point about the little pressure of long standing.

I have tried vaccines repeatedly, as suggested by Dr. Logan, but have not gotten the results.

Dr. Mayer spoke of crises and the use of ergot. In my text I brought out, partly as a matter of speculation, that there is in some canals a considerable pad of fat; in the optic canal there is exceedingly little. If this hyperplastic process narrows the canal and this pressure is maintained for a considerable time, nature's shock absorber is used up. Sometimes a trifling indigestion will start up the trouble, just as sometimes a trifling thing will diminish the vision. If ergot is given when there is this congestion, it will contract the tissues and relieve the headache.

Dr. Stout, closing the discussion: I merely wish to say, with reference to Dr. Casselberry's remarks, that I distinctly said there was apparently no pus.

The Effects of Radioactivity Upon Nasopharyngeal Fibroma.

By D. Bryson Delavan, M. D.,

New York City.

The conditions due to the presence of this growth are usually so urgent as to demand relief.

For this three varieties of treatment have thus far been practiced:

1. Removal of the tumor after preliminary operation done for the removal of obstructing parts.
2. Removal through the natural passages by evulsion or with the cold snare.
3. The reduction of the size and the vascularity of the tumor by electrolysis or by the injection of various chemicals, followed by the removal of the remaining mass by means of the galvanocaustic loop.

Of these methods the first is illogical, unsurgical, and, as experience has abundantly proved, deadly; shock from the preliminary operation is severe, hemorrhage profuse, and if the patient survive, deformity from the preliminary operation is serious and recurrence of the growth common.

The second method is much better than the first, but may provoke serious hemorrhage and shock, and is apt to be followed by recurrence.

The third method is by far the best. Although tedious and sometimes painful and requiring considerable skill, statistical comparison shows that of twenty-seven cases removed after severe preliminary operation in which end results were given, fifty-nine per cent were reported "cured" and twenty-six per cent died. Of forty-one cases removed through the natural passages by evulsion or the cold snare, five per cent died; and of sixty-six cases by electrical methods, one hundred per cent were cured.

Much attention has of late been given to the treatment of uterine and other fibromata by means of the X-ray and of radium, and both in the United States and in Europe the apparent success attained renders the method worthy of consideration. The similarity of type between the uterine and pharyngeal growths at once attracts the attention of the laryngologist to the new treatment.

Fibromata of the nasopharynx are relatively much smaller and more directly accessible.

The complete reduction of the nasopharyngeal growth might not be essential, since it tends to diminish spontaneously after adolescence and finally disappears. If its growth could be controlled during the earlier years and until after the period of its activity, nature would in some cases at least intervene to effect a cure. Cases of slow development occurring in older rather than younger patients would offer the best prognosis. Judging from the effects of radium in other cases, its action would be active and profound; more may reasonably be expected from it than a moderate reduction in size.

Dr. Robert Abbe, pioneer in the use of radium in the United States, has originated many ingenious devices for its application to various organs of the body, and especially for its use in the nasal and nasopharyngeal region.

In the application of the radium, the parts to be treated must be exposed to the rays, and the healthy surrounding parts must be protected from them. It is not necessary that the radium should be introduced bodily into the substance of the growth, as the blood vessels of the growth are more abundant near its surface, and as the rays penetrate at least a quarter of an inch, the treatment is entirely effective in profoundly influencing the circulation, and thus, as well as by its effect upon the connective tissue of the organ, causing a reduction of its size. Proper regulation of the strength of the radium and the duration of the exposure will prevent injury to the surrounding healthy parts. Should the radium treatment prove as valuable as it promises, the world may be congratulated that the unhappy record of past surgical failure will have been closed.

DISCUSSION.

Dr. Cornelius G. Coakley, New York City: Dr. Francis Carter Wood has been experimenting, as all know, on various animal colonies with radium; he has also done some clinical work with this agent. He has been kind enough to use it in several cases which I have sent him during the past year and a half. In a case of epithelioma of the nose, radium had a very favorable effect. The patient had a bad case of arteriosclerosis and died from cardiac trouble. All trace of the epithelioma had disappeared. Several cases of papilloma of the larynx were cured by radium. In one case the papilloma had existed from early childhood to the age of forty or more. In another case treated by him there was an angiofibroma which completely filled the nasal cavity, the mass being visible without a nasal speculum. He used eighteen milligrams in a very small glass tube wrapped in ordinary adhesive tape. This was thrust into the nose, and was followed by profuse bleeding. At the end of two weeks no change in the mass could be noted. For some reason the boy did not return to the clinic for eight or ten days, and when he returned it was found that the mass had decreased in size. A brass capsule containing eighty-three milligrams of radium was then inserted, the posterior end of this tube extending into the posterior nasopharynx. This was left in for twenty-four hours. The excoriation all around the face was simply remarkable. No X-ray burn ever compared with this burn. Dr. Wood told me I need not worry about it, as it would diasppear, which it did. The radium was applied in February, and the inside has not completely healed. The patient can breathe through the nose, however, and it is possible to look right through into the nasopharynx. The mass is attached to the posterior wall of the nares and apparently somewhere in the posterior ethmoidal region on the left side. Since the radium has been used the hemorrhages which the patient had at irregular intervals have almost entirely ceased. The radium is pretty apt to cure this fibroma. A smaller dose in this case would probably have been better.

Dr. Otto T. Freer, Chicago: I have used radium, but not in the treatment of fibroma. We have at our command a means which we did not have a few years ago. I have removed a very large fibromata, with a keen knife, from behind, after having injected directly into the growth a double dose of pituitary extract, two ampullæ, followed by adrenalin. The hemorrhage did not exsanguinate the patient. There has been one recurrence since.

Would not the combination of surgery with radium be less tedious and more satisfactory than radium alone in the removal of fibroma that enters all the cavities?

I was interested in the recovery which Dr. Coakley reported. Dr. Frank Dudley Simpson, of Chicago, who has employed it so extensively, says he has never had a recovery.

I would like to ask Dr. Coakley how long after the use of the radium the burn appeared, and how long the radium was used.

DR. COAKLEY, continuing the discussion: This is not the only burn which has come under my observation. I recall a case treated by Kelly, in which there was a most terrific burn, resulting in extensive infiltration and suppuration. That was a year ago last December. There was a recurrence of the epithelioma of the larynx, and the patient went down some time in March for further treatment. The radium was used without external reaction, but with such extensive internal reaction, with swelling of the arytenoid folds and aryepiglottic tissues, that it was almost necessary to do a tracheotomy.

In the case I cited, the boy had had no treatment for a week, when superficial ulceration appeared all over the skin of the nose and cheek. It was extraordinarily painful. The pain following the use of radium is what patients object to. There is no question of its activity.

DR. DELAVAN, closing the discussion: I cannot conceal my great satisfaction with regard to the cases which Dr. Coakley has presented. I have been studying this matter of nasopharyngeal fibroma ever since I was an undergraduate student. I have seen the best surgeons take these cases and end with very unsatisfactory results. Statistics show that surgical procedures of any kind are dangerous. Evulsion, removal with a snare, and other methods, may be followed by hemorrhage. As far as I can compile statistics on the subject, there are five deaths in a hundred, as the result of shock or hemorrhage. There is always the danger of recurrence. The application of radium requires a certain amount of skill, but no surgical skill.

SYMPOSIUM.

THE CONSIDERATION OF PANSINUITIS EXCLUSIVE OF EXTERNAL OPERATIONS.

The Etiology of Pansinuitis.

BY J. GORDON WILSON, M. D.,

CHICAGO.

There are local anatomic and physiologic factors which explain why pansinuitis does not occur more frequently; factors which when they are defective or destroyed lead to its occurrence and persistence. Of great importance are the ciliated cells and the lymphatic system. The action of the cilia and the arrangement of the lymphatics are such that in each sinus there is an independent anatomic and physiologic mechanism of simple type, adapted to free the cavities from such local irritants as may arise during the normal life of the cells which line it, or may accidentally invade the sinus during respiration; and an isolated lymph system giving protection against microbic invasion. On the other hand, the vasomotor mechanism is common to all.

During a rhinitis, as the local inflammation subsides the congestion in the sinus disappears, the cilia rapidly recover, and the exudate which is not absorbed is cast out by the cilia movements, and the sinus recovers. If, however, the inflammation be so acute that the physiologic protectors and barriers are interfered with or no longer effective, the morbid processes are different. The result is an interference of ciliary action and a lymphatic stasis. In chronic pansinuitis the same processes are at work interfering with the removal of secretion, producing a lymph stasis and finally a bacterial invasion. Other factors may influence these processes, as, for example, narrowing or obstruction of the ostia or nasal cavity from mechanical causes; disease in the adjacent part of the nasal cavity which has resulted in destruction of the cilia; scar tissue, or tissue devoid of cilia, either from disease or from a nasal operation.

The chronic turgescence may be so gradual in onset as never to awaken suspicion. It may be so slight that it is beyond our diagnostic ken. It may be so slight that bacterial activities and toxin effects are counterbalanced by tissue activities or antibodies within the limits of health. In such cases a slight increase in congestion may be enough to disturb the balance; or debilitating diseases and hematogenous infections set up a pansinuitis.

The writer sketched briefly the organisms found. He believed that the organism is most often an invader into an already damaged sinus. Since the same morphologic organism can vary so much in its virulence, until we know more about the cause of this variation we are not likely to get far in considering its etiologic significance.

A healthy sinus has great protective power against bacterial invasion and great recuperative power after the simple hyperemias which occur during a rhinitis. We have the potentialities of a pansinuitis in the chronic rhinitis with its constant or recurring circulatory disturbances, vascular and lymphatic, with the risk of excessive accumulation of foreign exudate, and a nasal cavity more or less infected.

The disturbance resulting from the first is such that there follows the failure of the second, which inevitably leads to the invasion of bacteria. It is well to remember the possibility of an accessory sinus being charged by the products of a low-grade inflammation which apparently show little or no local effects. The wise treatment will recognize why nature has broken down and aim as far as possible at compensation. It will aim at not leaving any one sinus so impaired that it acts as a source of danger. To replace epithelium in a dependent cavity by scar tissue is to replace it by tissue with no physiologic action. I cannot conceive of a healthy antrum ever existing after extensive curettement.

The teaching of nature is obvious. The mucous membrane of the accessory sinus is doing important work. We may aid by reducing chronic vascular and lymphatic engorgement. We may aid by assisting in the removal of excess of secretion. But if we do so at the expense of permanent damage to the ciliated walls, we may well go slow, and ask what compensation we offer for this loss.

The Nonoperative Treatment of the Accessory Sinuses.

By Lewis A. Coffin, M. D.,

New York City.

The writer has ceased to think of the cure of the diseases of the accessory cavities of the nose by either operative or nonoperative procedure, and is satisfied when he has accomplished a result sufficient that he may consider it as arrested.

Negative pressure in conjunction with autogenous vaccination has been followed by very satisfactory results.

By means of his special apparatus the writer applies suction, drawing mucus from the cavities, using in special instances a canula connected with the suction apparatus; following this, air is made to enter the vacuumized cavities under considerable pressure, medicated by a nebula of oil variously laden with remedial agents.

By using autogenous vaccines in conjunction with this procedure he has been able in two chronic cases to cause an entire cessation of discharge, in which suction alone in conjunction with the vaccines had failed entirely.

The negative pressure should be started low and gradually increased, while the nebula is thrown into the nose under a pressure of ten to fifteen pounds.

For medication he uses either an oil loaded with Bulgarian bacilli or an iodin preparation. A description of the apparatus followed.

Observations Upon the Intranasal Exenteration of the Ethmoidal Labyrinth in Pansinuitis.

By Harris P. Mosher, M. D.,

Boston.

The speaker detailed the fundamental points in the anatomy of the ethmoidal labyrinth, describing the anterior cells, the nasofrontal duct, the unciform cell, the posterior ethmoidal cells and the superior nasal spine.

After mentioning Hajek's and Ballenger's operation, he then described his own method, as follows:

The anterior end of the middle turbinate is first removed. The initial plunge of the curette into the ethmoidal labyrinth is best made by disregarding the agger nasi cell if it is present and going higher on the superior overhang—that is, the extreme upper part of the middle turbinate and a little further backward. If the curette does not readily break into the labyrinth, it should be carried a little higher and a little further back. Finding this point may bother the beginner. Once in the labyrinth the curette is turned and swept forward until it strikes the posterior surface of the ascending process of the superior maxilla. Then it is turned so that it faces posteriorly, and by backward and downward sweeps the unciform process, the ethmoidal bulla and its cells are opened. The cavity so made in the anterior part of the ethmoidal labyrinth is cleared of fragments by using a small round tonsil punch. The operator is now ready to probe for the nasofrontal duct and to enlarge it by sounds, rasps and bur.

In a great majority of instances the ascending process of the superior maxilla is a guide to the nasofrontal duct so that a probe slipped upward along its posterior border finds the sinus. In the small percentage of cases where this fails the duct can be found by carrying the probe backward to the limit of the roof of the operated cavity and then bringing it forward with the point turned outward. Only as a last resort should the point be turned inward.

The second part of the operation: The head of the patient is held so that the cribriform plate is level, and it is kept so. The curette is now plunged through the attachment of the middle turbinate and carried backward to the outside of the middle and superior turbinates to the front wall of the sphenoidal sinus. This is firm and stops the instrument with a dull and sometimes with a sickening thud. The face of the curette is now turned downward and the bowl and shaft forced through the bottom of the ethmoidal labyrinth. This generally leaves the posterior half of the middle turbinate dislocated and hanging. The middle is removed by snare or conchotome.

The lower two-thirds of the inner wall have now been removed. The upper third of this wall is left as a prominent anteroposterior ridge, composed in front of the middle turbinate and behind of the superior turbinate. As much of the turbinate ridge as possible should be removed. The amount of the ridge left at the end of the operation determines the thoroughness of the exenteration. Whenever there is an appreciable ridge left there is a chance to remove the inner wall of one or more of the posterior cells. It is especially important to get this remaining portion of the inner wall of the labyrinth removed posteriorly, in order to do away with the inward bulging of the labyrinth which so obscures the nasal face of the front wall of the sphenoidal sinus. For this purpose the round tonsil punch is very convenient. The sinus is now evulsed or laid bare as needed. Finally, the inner surface of the os planum is curetted from behind forward. Packing over night is advisable.

The writer does not consider that an ethmoidal case is ever free from the liability of a recurrence.

While the writer has had no deaths, such have been recorded, and there is always danger in ethmoidal operating.

The method of removal of the nasal spine appeals to the writer, provided the anterior ethmoidal cells are dealt with at the same time.

In all chronic cases of antral disease the writer prefers opening the canine fossa to the intranasal route.

The Frontal Sinus—Opening it Through the Nose.

By Otto T. Freer, M. D.,

Chicago.

The intranasal frontal sinus operation has been developed in the last ten years, and principally by E. F. Ingals, Max Halle, Segura, Vacher, H. P. Mosher, P. Watson Williams and Herbert Tilley. Freer's article is based upon their work and original observations.

Anatomy.—The frontal sinus outlet or ostium is bounded in front by the crista nasalis interna, internally by the expanded portion of the anterior superior nasal spine of the frontal bone, externally by ethmoid cells lying between the ostium and the lacrimal bone, posteriorly by the anterior ethmoidal cells, which extend from the ostium posteriorly underneath the orbital process of the frontal bone and are completed and roofed by it. Removal of the ethmoidal cells thus forming the portion of the sinus floor behind and external to the ostium gives a space for drainage greater than that created by cutting away the internal nasal crest forward with rasp or bur, while the opening is more likely to remain permanent. It may, however, be necessary to cut away both the cells and the crest to open the sinus sufficiently.

The Operation.—This usually begins with the severing of the anterior attachment of the middle turbinate or with resection of its anterior half, if necessary. In some cases a projecting middle turbinate may be left intact. If needed the uncinate process is next cut away with the Freer sharp septum elevators to expose the bulla ethmoidalis fully to view. With a ring curette whose edge is directed forward and obliquely upward and inward agains the bottom of the bulla, the bulla is entered and the curette is made to sweep away the anterior ethmoid cells from the bulla forward and upward to the ascending process of the superior maxillary bone, and, if possible, to the sinus floor, breaking through the latter and entering the sinus behind the crista nasalis interna. If the sinus floor prove too hard to give way to the curette, an especially devised probe curette is passed through the sinus ostium after the way through it has been found by an ordinary probe, and the probe curette is made to cut its way out of the sinus through the ethmoid cells under the orbital plate of the frontal bone, thus enlarging the ostium posteriorly so that a larger curette of the same form may be passed up into the sinus to clear away all of the cell remnants under the orbital plate and in the pathway down into the nose from the sinus, this pathway lying between the lamina papyracea of the ethmoid bone and its turbinal wall. If necessary the ostium is enlarged forward also with a straight bur driven by the dental engine. The preference is, however, given to posterior enlargement because of the tendency to the postoperative formation of obstructing cicatrices in the region of the crista nasalis interna.

It is unsafe to curette inward in enlarging the frontal sinus ostium, as there is danger of entering the cranial cavity through the wall of the fossa olfactoria, especially if a torus olfactorius, as described by L. Onodi, exists.

In cases where the suppuration continues in marked degree after the intranasal operation, while the sinus remains open for intranasal drainage, the external operation must be resorted to. Where great swelling of the lid, exophthalmos or cerebral symptoms indicate the existence of caries of the sinus wall and progress of the disease beyond it in the form of sinuitis frontalis exulcerans (Killian), the intranasal operation should not be attempted.

Explanatory illustrations accompany Dr. Freer's article.

Two Cases of Chronic Pansinuitis Associated With Systemic Infection.

By George E. Shambaugh, M. D.,

Chicago.

Both cases occurred in young women. One case was caused by a diseased tooth; the cause of the other case is not clear. In both, every accessory sinus on both sides was involved. Intranasal operations succeeded in curing the infection in all the sinuses except the frontal sinuses in one case, while in the other even the frontal sinuses are apparently healed. In one case an attack of acute articular rheumatism occurred, apparently from the focus in the sinuses. The opening of a large posterior ethmoid cell and the neighboring sphenoid sinus was followed by a disappearance of the rheumatism. In the other case a severe chronic arthritis, involving every joint in the body, occurred as the result of a severe acute articular rheumatism which followed an acute exacerbation of the long-standing sinuitis. This case was subject to recurring attacks of acute exacerbations, associated with fever and increased pain in the joints, until by persistent efforts apparently the last focus of pus in the sinuses was drained. Since the sinuitis has been cured there has been an absence of acute exacerbations, but the inflammatory process in the joints is undergoing fibrous changes, resulting in increased rigidity of the joints.

DISCUSSION ON SYMPOSIUM ON PANSINUITIS.

DR. HARMON SMITH, New York City: I have here an instrument which bears on the treatment of the conditions under discussion. It works along the line of creating a vacuum, and, while there is a vacuum, lactic acid bacilli are injected. The syringe is loaded with lactic acid bacilli in a solution of argyrol, enzymol, or any other preparation. By means of the syringe the solution is forced into the sinus. A bicycle pump may be employed to create the vacuum. The instrument can be used at home, and should be employed two or three times a day. Subacute and chronic cases have all improved under this method of treatment.

DR. THOMAS HUBBARD, Toledo: Referring to Dr. Coffin's method, I have one criticism to offer concerning the actual amount of negative pressure used. The statement that he used so many pounds of negative pressure is absolutely incorrect, because the mucosa will stand not more than four or five pounds. This can be determined exactly if measured by a manometer. Three or four pounds is my experience. There is more or less hemorrhage from five pounds of negative pressure.

DR. HENRY L. SWAIN, New Haven, Conn.: The idea of Dr. Wilson's paper is in line with what I have always held. If the ciliated membrane of the cells can be preserved, better results will be obtained than would otherwise be possible. The less the traumatism the better.

I had the pleasure of seeing two of the cases mentioned by Dr. Coffin, and the exhibition of the method on the patient. I learned a great deal from the demonstration. I saw him treat a man into whose nose I could easily see. The patient had lost his septum and it was possible to see into the sphenoid sinus. Everything was very open and apparently clear. I could see no secretion at all, yet Dr. Coffin got out a tube half full of secretion. It was not only serous matter, but pus as well, and was colored with iodin which had been introduced two or three days before. In the case of the woman there was some pus along the floor. This was all sucked out. At the present time the right side of the face transilluminates better than the left. The effect of the Bulgarian bacillus will be proved by time. The applicability of the apparatus has been demonstrated.

I was called upon to treat a case of acute antrum disease in a man who had a round opening in his septum. By going in on the opposite side I could use small tubes or probes, and could flush out the antrum through the natural opening. I could look in through one nostril, put the tube in, and flush out perfectly well.

Dr. John F. Barnhill, Indianapolis: Two years ago I saw Dr. Mosher's specimens and his method of operating at that time, and I have employed the method since, with very good results. The limitations can be well marked out, and that is what makes Dr. Mosher's method safer than some of the others. The Ballenger operation is dangerous unless the bone is soft. Where the bone has been softened by the polypoid masses, and where the cells are filled with polypi, the Ballenger method is excellent. Until the posterior retaining wall is reached the operator is within the field of safety. So, then, we are working within a bony capsule, the limitations of which, unless too diseased, will give the sensation of where we are working. In the absence of these limitations the Ballenger knife is useful.

Dr. Charles W. Richardson, Washington: In the Mosher operation I have met with one complication, which I am surprised that others have not met—the possibility of entering the antrum. There is danger unless one is very cautious in making the downward stroke.

Dr. E. Fletcher Ingals, Chicago: The Mosher operation for the ethmoid seems to me in every way desirable. However, it has not appealed to me to leave the middle turbinated body until the end, unless the posterior cells are also involved. I prefer to take off the anterior portion of the middle turbinate, as it gives a better view. In acute cases of frontal sinuitis the Mosher method is admirable for opening up the sinus.

The intranasal method of opening the frontal sinus which I devised several years ago has answered my purpose better than any of the methods described, giving ninety per cent better results in chronic suppurative frontal sinuitis. In acute cases I cannot get the probe in. The instrument which I use is six millimeters in diameter. I have had four or five cases in which I could not pass it the whole distance. I would get in half way, and be unable to go farther; I would then pass in the bur. The probe prevents one from doing any harm. If it is merely the frontal sinus that is diseased, this method gives all the opening that is necessary. In ninety per cent of the cases the patients get well just as rapidly as they would from any of the more severe operations. There is no use, as a rule, in making an opening of more than two millimeters in diameter.

Dr. Lewis A. Coffin, New York City: I employ a method modified somewhat after that of Mosher. He goes in with a curette, I go in with a chisel. I know by a slight tap whether I am on solid ground. There is a big safety space of about half an inch. I make an up-and-down incision with the chisel, then bear upward toward the median line, and at that point introduce Luc's forceps. I take out all I can. Three bites and I am looking into the sphenoid. There is very little hemorrhage; I have never had to pack a case. It may be necessary to clean up with angular forceps and curette, but to me this is the easiest way.

Dr. William E. Casselberry, Chicago: In the earlier years I employed the Hajek method; of late I have adopted various methods. I have followed Mosher's plan, and I have used Coffin's method, except that in all these methods I first remove the anterior end of the middle turbinated body. That which is left of the turbinal is sufficient as a guide, without having the anterior end in the line of the light and shutting off the view. It has been stated by Watson Williams and others that the upper wall is so rich in lymphatics and blood vessels that there is danger of the communication of sepsis to the brain. That statement has deterred me several times from making my operation as complete and thorough as I wanted to make it in order to enter the sphenoid. I have also found this turbinal plate very hard and difficult to get through. In certain instances I have felt it almost impossible to get down on a level with the sphenoid wall in order to do the classical Hajek operation and the Mosher operation. I have thus been obliged to leave quite a ridge projecting down.

Dr. Wilson, closing the discussion: We do not know much about the lymphatics of the upper part of the nose; most of our knoweldge is theoretic. If we inject the subarachnoid space of the brain we can pass dye into the olfactory nerve. We know that the olfactory nerve is surrounded by lymphatics, but we do not know that by injuring the olfactory nerve we will communicate sepsis to the brain. Anatomists teach that it is dangerous to subject the olfactory nerves which come out from the cribriform plate to injury; further than that they do not know.

Dr. Coffin, closing the discussion: Answering Dr. Hubbard's remarks about the amount of pressure: the gauge is graduated, but how I do not know.

Dr. Mosher, closing the discussion: I am sorry to have added to the nomenclature, but the term agger nasi seems to me to be better for the cell at the ensiform curve than lacrimal or infundibular.

The selection of a method of operating upon the ethmoidal labyrinth is a personal matter. The danger of working in the extreme upper and anterior part of the middle turbinal has been mentioned by Watson Williams, and also by Freer. The higher one goes the greater the danger. Two patients died from meningitis, as I said in the paper.

I do not see why the rasp is more dangerous than the bur.

For the last year I have removed the anterior end of the middle turbinal, as a routine procedure.

As to opening the antrum, as suggested by Dr. Richardson: The amount of overhang varies greatly. In extreme cases the overhang in front is great. In many cases of frontal sinuitis the antrum is already infected. One also runs the risk of infecting it by taking off the unciform process, as the inner wall of the antrum is opened as soon as this is removed.

Dr. Otto T. Freer, Chicago: Quite a number of years ago Holbrook Curtis gave a description of an intranasal antrum operation in which he used trephine and bur. I modified this operation. In the course of ten years I have had unvarying success in opening with the trephine and bur. I have had complete recovery in some sixty cases of antral suppuration. Most of them got well as soon as there was an opening in the lower meatus. It is not always necessary to resect the anterior turbinated body. The trouble with the Ingals operation is that you get a beautiful opening at first, with a tendency to contraction. Whether I use the Ingals bur or another method, I think his tube may be a valuable aid in keeping an opening.

Referring to Hajek's operation, it cannot be denied that he has done a large amount of work since 1905. He has enough cases now to speak authoritatively. He has another flap operation which should be studied. He objects to the rasp on account of the danger of breaking down everything and inducing meningitis. He works with a bur, which I have used and have found to be a safe instrument. Hajek is absolutely right in regard to his bur. The cutting forward is apt to be followed by contraction. I did not object to the term agger nasi cell, but I did object to the term uncinate cell.

Dr. George E. Shambaugh, Chicago: The question raised by Dr. Casselberry with reference to the danger of setting up meningitis holds if the wrong method is followed in operating upon the ethmoid. Taking the whole mesial plate of the ethmoid, and pulling and tearing off pieces, will lead to extension which will eventuate in meningitis. That should be left alone, and work be confined to the labyrinth. The labyrinth itself has no communication with the intradural space.

As to the use of the rasp: I do not push and pull down, but use it gently. Used properly, it is not a dangerous instrument.

It is unfortunate when everybody tries to use different terms for the same anatomic structure. Most anatomic terms are fixed by the anatomic nomenclature. The term "infundibulum" is used incorrectly. "Infundibulum ethmoidalæ" is the term used by the Nomenclature Congress at Basle.

Another term which we have been using wrongly throughout this discussion is the synonym for inflammation of the sinus—"sinuitis," which has been incorrectly called "sinusitis." We might as well get into the habit of using correct terms.

Tonsillectomy in the Adult—Are We Justified in Doing so Many Indiscriminate Tonsillectomies for Remote Infections?

BY CHARLES W. RICHARDSON, M. D.,

WASHINGTON, D. C.

The paper deals with the ingrained feeling in the profession that the tonsils are probably the sole focal source of general infection. This view has extended not only into the general profession, but has also become an obsession of the laity, so that there are a great many cases of tonsillectomy which are operated upon, in all probability, with an imperfect study of the cases, and the want of proper realization of the relation of causes and effect.

He also called attention to the number of other focal sources of general infection. He stated that there was no question of the necessity of tonsillectomy in a certain class of cases, where there was decided preexisting or present evidence of local disease. He doubted that there was any necessity of removing the tonsils, except in unusual cases where there was no evidence of disease or tenderness or hypertrophy, wherein there was general infection, simply for the purpose of correcting such a condition. Dr. Richardson also disapproved of the removal of tonsils wherein there was simply the history of a previously existing case of tonsillitis preceding general infection, and wherein the tonsils seemed absolutely normal at subsequent inspections. A number of cases were given to bear out these contentions.

DISCUSSION.

DR. HENRY L. SWAIN, New Haven: The ideal way is for the general practitioner to send patients to us to ask if the tonsils should be removed, but most of us are confronted with the exactly opposite condition. The nurse, the relatives, or others will send a patient to the hospital "to have the tonsils removed." Some tonsils certainly do not need to be removed. Tonsillectomy is undoubtedly performed in many cases in which it is not needed; that is wrong. Any method which will lead to some way of estimating quickly and accurately as to whether a tonsil should or should not come out would be of tremendous advantage.

DR. G. HUDSON MAKUEN, Philadelphia: I have had several letters from Dr. French concerning his work. He promises to bring this subject before us at our next meeting in Washington. He is now able to tell whether or not a tonsil is diseased. He thinks he will be able to look in the mouth and tell whether or not pus or detritus of any sort is there, and whether or not it should be removed. It is not a question of whether or not the tonsil should be removed, but what should be done; it is a question of the prevention of the trouble, just as the prevention of sinuitis is advocated. The cases of which I am proudest are those in which I have done the least operation. When pus is found in the crypt it is possible to cauterize the edges of the crypt, to open and drain, without trying to do an extracapsular, intracapsular or any other kind of an operation for tonsillectomy. Some of these cases are inoperable, and it is far better to give good drainage and to remove the possibility of infection. I think that can be done in a great many cases, and radical surgery thus be avoided.

DR. WILLIAM E. CASSELBERRY, Chicago: I cannot say that I feel thoroughly in sympathy with the point of view presented. It goes without saying that we should not remove tonsils which we are sure are healthy and which will not give rise to systemic infection. It goes equally without saying that we should remove those which are harmful. I am unable to assure the internist that the tonsils are not the source of systemic infection, even after I have evulsed the pillars and have explored every repository of infection, because the tonsil is a sponge, and may be still the source of infection after such exploration. Many times when the internist sends us a patient for examination of the tonsil, and we find no infection there, we should look elsewhere for the source of the trouble; we should look above. There are ten cavities just above. Sinus suppuration is exceedingly common, and is not infrequently the primary source of infection in the tonsil itself. If we remove the tonsil we are still not sure that we have removed the source of infection. Our duty to the internist is to find the source of infection if it is not in the tonsil.

Dr. Thomas Hubbard, Toledo: Dr. Casselberry's remarks about finding the source of infection applies to the teeth. Given a case of some form of systemic infection, probably of focal origin, it will be our first duty to prove that the tonsil is or is not diseased, and then to find the real source. The method followed is extremely interesting. Dr. Price of Cleveland is able to study the condition of the peridental tissues, and, by culture of the various bacteria obtained, to tell the influence upon the system. In this way he has been able to exclude certain teeth and to find the diseased root which is the source of the active organism. In doubtful cases, where there is objection to operation, we should be able, by some such method, to tell whether the tonsil is the source of infection.

Dr. Hanau W. Loeb, St. Louis: It is easy enough to exclude the teeth, or pyorrhea, or a small abscess at the roots; but it is not easy to tell when the tonsil is at fault. In a case of rheumatoid arthritis, getting worse for one, two, or three years, in which repeated examination revealed nothing, and in which the tonsils are not specially large, would you leave those tonsils? I have recently had such a case of rheumatoid arthritis, examined by various internists without result. I removed the tonsils, made a vaccine after the method of Rosenau, used it, and the patient got better immediately. Because the danger of increasing the pathologic process by a single attack of mild tonsillitis is so great, I think we are justified in removing the tonsils, providing, of course, the age and the general condition of the patient permit. While we should not remove tonsils indiscriminately, in the presence of disease which cannot be otherwise located we are justified in removing them.

The appendix and the tonsil are very closely related as to structure. The fact that removal of the appendix was followed by cure of the rheumatoid arthritis does not necessarily mean that the tonsils should not be removed.

Dr. James E. Logan, Kansas City: Nothing has been said of one source of infection which to my mind is very important —the vault of the pharynx. I think many infections come from failure to appreciate a condition in the vault of the pharynx which is there by reason of neglect of inflamed or degenerated adenoid tissue, possibly, a constant source of irritation. If we will clear out these vaults, clean out this adenomatous, fibroid or lymphoid tissue, we will get rid of many cases of systemic infection.

DR. GEORGE E. SHAMBAUGH, Chicago: The word indiscriminate would exclude all discussion, because no one believes in removing tonsils indiscriminately. However, the whole subject of removing tonsils for systemic infection is very important. The question of focal infection in systemic disease is much better appreciated by internists than by specialists. One of the most important chapters in medicine is the relationship of focal infection to systemic disease. Not only these rheumatic conditions, but Bright's disease, chronic neuritis, enlargement of the thyroid, appendicitis, have been traced definitely to tonsillar infection. At the Presbyterian Hospital, in Chicago, where most of this work has been done, it has been found that there is a distinct relationship between appendicitis and tonsillitis. Duodenal ulcer, also, often results from focal infection. It is not always the tonsil, however, that is the source of the focal infection. Pus taken from focal infection anywhere else, injected into a guinea pig, will produce gastric ulcer. The infection is produced through some selective action. We are now merely on the threshold of this entire subject. These questions should not be worked out in an isolated way, by dentists, by nose and throat specialists, or others, but by all together.

The question is, how accurately can we tell when the tonsil is at fault? My opinion is that in most cases we can tell pretty accurately. One way of telling is by the history. If a patient has had an attack of rheumatism following an attack of tonsillitis, there is good reason to believe there is an association between the two. I would not take the risk of another attack of tonsillitis in a case of endocarditis. Many patients deny having had sore throat, and in many cases it is possible to find pus in the tonsils of patients who have never had tonsillitis. If we are not able to demonstrate any positive evidence of the tonsil being the source of infection, can we exclude the possibility of its being so? Before removing the tonsils in such cases I want a capable internist to go over the case; if he cannot find any focus, the tonsil is the most suspicious source. I may cite an illustrative case. A woman, of perhaps fifty years of age, consulted me two and a half years ago, saying, "I have neuritis in my right arm; I want you to take my tonsils out." I asked her why she thought she had tonsillitis. "Some of my neighbors," she said, "have rheumatism, have had their tonsils taken out, and are better." She was under the care of Dr. Billings, and I sent her back to him. She came back after a week, saying he said take the tonsils out. I could express nothing from the tonsils. In removing one of the tonsils I opened an abscess. The patient got well of the neuritis. Another case in point was that of a physician who had had rheumatic fever for several years, an attack every year. He had had five attacks of tonsillitis. The internist could find no other source of infection. The man was seventy-one years old, and did not want to have his tonsils removed. He continued to have the attacks of rheumatic fever. I finally took out his tonsils, but he was not improved. It was then found out that he had an urethral abscess; treatment of this cured the rheumatism.

Dr. Otto T. Freer, Chicago: Why should the internist be the one to make these examinations? He can examine the chest, the abdomen, etc., but he is not the one to examine the nostrils There has been a slaughter of the innocent in this matter, with the general practitioner taking out tonsils. I agree that the tonsil is apt to be the source of infection, but the pharyngeal tonsil, as Dr. Logan has said, is more often the source of the trouble than the faucial tonsil. The lymphatics usually tell the story of focal infection. If I find no lymphatics involved, I am not inclined to consider the tonsil the cause of the infection.

Dr. Shambaugh, continuing the discussion: The internist is the one to help the patient to get the problem threshed out. Glandular infection has nothing to do with systemic infection.

Dr. Greenfield Sluder, St. Louis: It seems to me that there are two problems the solution of which will eventually clear up the question: first, the physiology of the tonsil; second, the perfection of Dr. French's work. The tonsil takes up what is put upon its surface very readily, this is quickly absorbed, and is thrown into the system beyond the tonsil.

Dr. Richardson, closing the discussion: After giving the title of this paper to the secretary last winter I was sorry several times that I had done so, because the more I thought of it the more I realized how difficult it would be to discuss the subject without incurring the ill will of one faction or another.

Dr. Casselberry agreed with me most thoroughly, without intending to do so. I am glad that Dr. French's work bids fair to solve the problem. Dr. Shambaugh has emphasized one point that I tried to bring out—that there are other points of focal infection besides the tonsil. It is our duty to be able to elicit these for the internist. Dr. Logan has called attention to the fact that there may be crypts in the pharyngeal tonsil which are as much diseased as the crypts in the faucial tonsil, and which are as apt to cause systemic infection. I recall a case, sent me by an internist, in which the patient asked me to look in her right ear. I did so, and found a chronic suppuration, which she said began when she was fourteen years old, following scarlet fever. She was then twenty-six. She had beginning rheumatoid arthritis. I did a radical operation on the ear, but did not touch the tonsils. She is well and working.

We must conscientiously go into these cases, examine the ears, the sinuses, the vault of the pharynx, the teeth, and note whether these will help us in the study. It is not only rheumatoid arthritis, but all the other forms of infection, that may be due to these focal lesions. In cases which cannot be made out thoroughly, even if the tonsils do seem to be infected, one must be on the lookout for syphilis and latent tuberculosis.

Effects of Protein Extracts From Fruits and Pollen on the Upper Air Tract.

By Walter F. Chappell, M. D.,

New York City.

The writer has recognized for some years that some people suffered from a variety of local irritations of the mucous membrane of the upper air tract and external auditory canal, which were attributable to eating certain fruits or drinking certain wines.

In the early summer cases of pharyngitis and laryngitis were classed as strawberry throats; in the autumn as cider and grape thoats, and an occasional tomato throat. In addition, pain, tenderness and swelling of the external auditory canal were traceable to eating apples and drinking cider. Occasionally an acute sneezing, accompanied by discharge and swelling of the mucous membrane of the nasal passages, followed eating quantities of grapes or drinking claret or similar red wines. In a few instances these symptoms were attended by swelling and burning sensations of the tongue and lips. There are children who have stuffy noses, constant colds, pharyngitis and croup due to the nature of the food they take.

Raw apples cause the greatest trouble, but when one is anaphylactic to one fruit he may be to several others.

Cooking these fruits greatly modifies their effect, but even then if taken in large quantities and continued for some time, they still produce irritations of a milder degree.

Believing that the protein extracts of fruits might be the cause of these conditions, protein extracts of apple, strawberry, grape fruit and tomato were made for the writer, and applied to five people known to be anaphylactic to apples, strawberries and to tomatoes, while a sixth person was used as control.

Terrific reaction followed the injection of one minim subcutaneously of apple protein extract of a 1 to 60,000 strength, with a drop on a small abraded surface. Local reaction only occurred in the second case, as also in the third case. Severe reaction followed the local application of the strawberry protein in the fourth case, and only some redness followed the intracutanetous injection of the tomato extract in the fifth case.

In hay fever cases the writer has seen much benefit follow the internal administration of cinchonidia sulphat, but he has seen no permanent cures following this treatment.

The laboratory reports are also presented.

Pollen Therapy in Hayfever.

By J. L. Goodale, M. D.,

Boston.

Methods of gathering and preserving plant pollens are discussed. A fourteen per cent solution of alcohol was found to preserve the pollen extract for several months. When hay fever patients receive an application of the exciting pollen to a scratch of the skin, a definite reaction occurs, consisting of edema, hyperemia and itching. The application of this test enables us to determine the special causative plants for each case. The intensity of these skin manifestations may be sensibly diminished by the repeated parenteral administration of the proteids in question. Coincident with the diminution in skin reaction there seems to occur an increased tolerance of the exposed mucous membrane to the pollens of the plants employed. Pollen therapy in hay fever may be regarded at the present time as a promising method of treatment, but its value and the permanence of its results remain still to be definitely established.

Serobiologic methods have shown the phylogenetic relationship of the different plant orders and families. The application of these discoveries to the treatment of hay fever by injection of plant proteids promises to assist in the selection of the specific material required for a given case.

DISCUSSION ON PAPERS OF DR. CHAPPELL AND DR. GOODALE.

DR. BURT R. SHURLEY, Detroit: I have been extremely interested in the working out of the question of sensitization to the pollens of ragweed and goldenrod, which are the only pollens I have been able to secure. The whole question of anaphylaxis and sensitization has been explained by Vaughan, of Ann Arbor, by the splitting of the proteids and the elaboration of toxins, ptomaine and leucomains. His theory is very rational. He has shown that egg white will kill a guinea pig in a short time. A toxic dose after the ninth day is fatal.

A number of Dr. Goodale's observations I have been able to confirm as I have worked along. If the dosage is run too high the depression is great, resulting, perhaps, from the exhilaration of the toxin.

One laboratory has turned out, from the clinical standpoint, practically all the pollen toxins which can be used in hay fever. Fifteen doses, in ascending scale, may be found in the market. The clinical value of this I do not know, but it is claimed that fifty per cent of hay fever patients are absolutely protected during the hay fever season.

DR. EMIL MAYER, New York City: The question of standardization is very important. Standard solutions, not stock solutions, should be employed. Standardization can be done and must be done, just as is the case with the pharmacopeia, in which a fluid extract represents so many grains. For this reason I resent the rushing in of a chemical firm and the presenting of a stock pollen. The work presented today is very gratifying.

DR. HARMON SMITH, New York City: The first patient mentioned by Dr. Chappell was a patient of mine, suffering from what I thought was eczema of the external ear, of uric acid origin. Since he was under my care he went to Dr. Chappell. He was a large man, of fine physical stature, weighing over one hundred and eighty pounds, and not at all neurotic. When I saw him he had a large welt on the arm, extending around about two-thirds of the arm. He was very sick, giving every evidence of great physical depression. The doctor mentioned in this paper I also knew very well. His reaction from the strawberry I am sure was produced absolutely by the protein in the fruit.

DR. MAX A. GOLDSTEIN, St. Louis: These reports convince us that we have been working in the dark for the last few years. Animal proteids, vegetable proteids, and the whole series and ramifications of proteid substances and their anaphylactic reactions, will have to be reduced to a system before any practical clinical work will be accomplished in hay fever. Standardization is necessary for practical purposes. Unless we can reach a more definite and limited basis we will never see the end of this tremendous field.

I have in mind the wife of a physician, an internist of unusual standing, who has used calcium salts for the second season, with no practical results as yet.

DR. GOODALE, closing the discussion: I wish to express my disapproval of the procedure which has been brought forward by the chemical firm, of what might be called a shotgun prescription for hay fever. As I understand it, it is to be used in the majority of cases of hay fever. It is possible that in a patient with one sensitization, by injecting this stock product another sensitization may be given.

Fluoroscopic Bronchoscopy. (Supplemental Report.)

By E. Fletcher Ingals, M. D.,

Chicago.

The fluoroscope is of much value in the hands of the well-qualified bronchoscopist. Its use will lessen the danger and decrease the number of failures where it is indicated. It is of especial value where there is so much mucus, pus or blood that it is very difficult or impossible to see the foreign body, or where granulation tissue covers the foreign body; where there is an abscess cavity in which the foreign body is hidden; where a stricture has formed, and in difficult cases in which the body is lodged in a bronchus going to the upper lobe of the lung, or in any bronchus where it cannot be exposed by the ordinary methods.

It is better not to use any anesthetic, and a narrow, strong forceps that will hold is specially important.

The surgeon standing at the left side of the patient's head and holding the bronchoscope, which was previously introduced to the foreign body, directs it by the shadow to the foreign body. The forceps is guided to the foreign body by the shadow, and the blades are opened and the forceps passed a little farther so as to grasp the foreign body.

Considerable traction may be required to draw the body through the strictue. Two cases are reported to further illustrate the utility of the method.

Report of a Foreign Body in the Lung, the Primary Diagnosis of Which Was Made by a Blood Examination—Removal—Recovery.

By George L. Richards, M. D.,

Fall River.

Male, twenty-five years of age, had occasional attacks of asthmatic breathing, bronchitis and chills from some time in early childhood.

It struck the writer as being peculiar that a young man should have occasional attacks of chest pain, occasional attacks of chills and fever of very short duration with only a suggestion of a cough, but with a moderate, steady leucocytosis and with no definite physical signs.

It suddenly dawned on the writer that these symptoms were suggestive of a foreign body in the bronchus, and that all the symptoms might be thus occasioned.

A Roentgen examination disclosed a tack in the right bronchus. There is no history as to when the tack entered the lung.

Dr. Chevalier Jackson, after previous administration of morphin and atropin under cocain anesthesia, and with the aid of the upper lobe bronchus forceps, after dilatation of the strictured bronchus, removed the head of the tack; the point was not forthcoming. The head was much eroded and oxidized. At no time could the tack be seen by direct inspection.

No reaction followed, and no chill or other further trouble with the lung has occurred since.

Foreign bodies which have been in the lung a long time and are unsuspected are probably far more common than any of us have yet ascertained.

DISCUSSION OF PAPERS OF DR. INGALS AND DR. RICHARDS.

Dr. Robert Clyde Lynch, New Orleans: I have here one of the first changes made in the Killian suspension apparatus. It allows for the movement of the horizontal tooth plate about an inch instead of a quarter of an inch, as with the Killian model. One of the great disadvantages of this was that the platform projected into the mouth, interfering with the view. In order to get rid of these disadvantages I constructed an apparatus which has a vertical movement. It allows the opening of the mouth, with nothing to obstruct the view. The principle was found to be entirely wrong; in other words, the center of gravity was found to be to the side of the middle, and the head would pull over to one side. This is shown merely as one of the mistakes made in the development of my apparatus.

The last improvement so far has served very well under all circumstances to which it has been applied. Most of my dissection work has been done in adults, who require more motion than children. It must be made flexible, and must have motion in excess of what is usually necessary. First of all, the base which supports the tongue spatula is extremely heavy and will not bend under any circumstances. I have suspended patients weighing as much as two hundred and fifty pounds.

Again, it will open in the vertical direction two inches, which is in excess of that given by other methods. It has another motion not obtained before. It also has a separable tooth plate. I now use two tooth plates, which will fit on in this fashion (demonstrating). This has the advantage of giving two points of fixation as against one. When the upper jaw is fixed against these two points it is prevented from moving from side to side. The double ring keeps the instrument in the center of gravity. In some cases where the patient is under suspension this screw will jam. In order to prevent that I have had a nut drilled and have a little handle which can be used to jack it up, just as you would use an automobile jack.

The spatula, which has given a good deal of trouble in keeping the tongue in shape, is constructed in my apparatus much on the pattern of the last Killian model. The wings are flexible; with it the sides of the tongue can be lifted up and kept flat. The handle, in other models, was hard to sterilize, so I have constructed one which is made of hard steel, so that it will not bend under the most trying circumstances. It is rough on the back, so that it will not slip. The point tips up a little, the wings are fixed. It shows the anterior commissure much better than is possible with the older models. The instrument is introduced closed.

DR. HARMON SMITH, New York City: Dr. Ingals' method of locating and extracting foreign bodies recalls an unfortunate case which I saw in consultation. The patient, a man, had inhaled a hand dental bur, which consisted of an aluminum handle and bur. The dentist had dropped this instrument on the patient's tongue, turned around to take up another instrument, and during this time the man inhaled the bur. He was advised to have an X-ray taken. He went to a business meeting down town, and afterwards had the X-ray taken. This showed the foreign body in the left upper lobe bronchus, high up. He then consulted an expert bronchoscopist, who worked an hour trying to extract the body. He failed. I was then consulted. I worked at it, but could not get into the bronchus. Another laryngologist was called in, who has extracted foreign bodies under similar circumstances, but could not extract this one. Dr. Jackson was telegraphed for, and came, bringing his own instruments and assistants.

He worked an hour or more, but was defeated. It then became necessary to remove a part of the man's lung. He was an old man, and died subsequently from the shock. It was impossible to turn the corner to get the foreign body in the ascending bronchus of the left lobe.

DR. THOMAS HUBBARD, Toledo: Dr. Ingals' remarks with reference to the liability of the indiscriminate application of the fluoroscopic method of examination are very timely. In a case recently under my observation the method was tried in removing a tack from the right lung. The tube was passed far enough down to reach the tack and turn it over. A very skillful fluoroscopist was assisting, the operation was prolonged for some time, and every effort made to extract the tack, but it was impacted by the method. It had been turned crosswise and had to be straightened out by a hook.

There is always danger to the fluoroscopist in these prolonged operations. The man whom I had has already lost one finger from epithelioma. There is also danger to the patient.

Sometimes foreign bodies become encysted. I recall a case in which a boy swallowed a nail. Several good diagnosticians went over him very carefully, but could not locate the nail. It was finally located by means of the X-ray, and proved to be an eight-penny nail, which was encysted. There were no symptoms from this foreign body. If the patient is conscious, he will often aid in telling whether we have gotten the foreign body. The finger-thumb action of the forceps is more delicate and positive than the grip with the hand. The action of the Ingals forceps is too stiff.

DR. JOHN F. BARNHILL, Indianapolis: I would like to ask Dr. Ingals to state his method of watching the end of the fluoroscopic forceps—whether an assistant, the fluoroscopist, or he himself watches the end of the instrument; also whether there is any danger of grasping the lung in getting through a spot where there is an abscess.

In the lay press, in all accounts of foreign bodies getting into the lung, the writer always says the patient swallowed a foreign body. Dr. Richards used the same term in his paper. Is it not aspirated or inspired?

DR. WILLIAM E. CASSELBERRY, Chicago: I would like to ask Dr. Ingals the arrangement of the table, and whether a specially constructed table is required; also whether the fluoroscope as ordinarily used is adaptable for the purpose.

Dr. Robert Clyde Lynch, New Orleans: I recall a case in which a nail was in the lower lobe bronchus. I had made a canvas cot, on a trellis, and put the X-ray tube under this. I directed the forceps from two points of view. To be sure I was in the line of the right bronchus, after getting the tube so that it actually touched the nail, the patient was swung over on his side, and an anterolateral view obtained. The nail was extracted without difficulty.

Dr. Ingals, closing the discussion: Dr. Richards spoke of the tack itself coming away piecemeal, or having been oxidized. I had an experience with a much larger nail which had been in a boy's lung for eight years. It appeared two or three times larger than it was. I got nothing but the head; the rest came up as a lot of black fluid.

I watch the forceps myself. In operating from the head of the patient I can look over and see. You cannot do this with someone to direct you how to move it.

It is on account of the danger of puncturing the lung that I caution gentleness. If you use enough force you can easily puncture the lung, but it is not at all necessary.

I understand perfectly the danger of prolonged fluoroscopy, and that is why I said one should always have an expert fluoroscopist. The light should not be turned on more than a half minute at a time. The operation should certainly not be prolonged excessively.

I use specially arranged tables so that the light can be placed wherever I want it. Sometimes it is necessary to have a simple board made which raises the ordinary table found in the hospitals.

This method should not be employed whenever a patient has a foreign body in the lungs; it should be the last resort. The foreign body should be found and removed by other methods, if possible. When the operation can be done under inspection it is much better. Where there is a stricture which is difficult to dilate, this may fail. Dilatation of a stricture is difficult. It may not be necessary, as it will sometimes dilate as you work if you can get the forceps through. It would not take more than two or three minutes to get through a stricture. When the foreign body is high up in the lung it is difficult to see it.

That can be helped a good deal by position. If the patient's head is turned to the side and the direct bronchoscope toward the middle, you can see the upper branch of the bronchus.

Dr. Richards, closing the discussion: The question arises in connection with these foreign bodies, how long and how much we are justified in searching for them? Dr. Smith's case calls to mind a case in which an attempt was made to remove a small gold pin of the safety pin variety. The patient was a young woman. Killian, before a committee of medical men, worked for an hour or more and failed. Later in the same summer Dr. Jackson tried to remove the same gold pin at the Rhode Island Hospital. He worked about an hour and a half, and gave it up. The girl went into the hospital as a patient, remained as a pupil nurse, has been there for two and a half years, and has never had any pain from that pin. It is a question sometimes whether we should not wait for more definite symptomatology. I think in Dr. Smith's case if they had waited the man might be alive today.

Dr. Smith, continuing the discussion: I was advised to wait in the case which I mentioned. The majority of the consultants wanted to wait, but Dr. Jackson said pneumonia might result. The matter was put up to the family, and they said operate by all means. The man was in such a nervous state it was thought he would die anyway. The head was bent over as far as the man's neck would allow, and it was determined that tracheotomy would offer no further aid. Dr. Jackson had recently read a paper in Brooklyn on the limitations of bronchoscopy. One week previous to that he had used similar instruments and had removed successfully a body which had gone down to the lower instead of the upper bronchus.

Dr. Ingals, continuing the discussion: As to the duration of the operation, one might well adopt the rule that one hour should be the limit. Ordinarily a half hour is sufficient. If the patient is in good condition one may keep on for an hour, and then try again some other day. It is better to let the patient live with the foreign body in than to keep on too long. Many patients live for eight or ten years with foreign bodies in their lungs. It is better to wait and give the patient a chance. The probabilities are that a foreign body in the upper lobe will settle down to where it can be more easily reached.

The Sympathetic Syndrome of Sphenopalatine (Nasal) Ganglion Neurosis, Together With a Consideration of the Neuralgic Syndrome, and Their Treatment.

By Greenfield Sluder, M. D.,

St. Louis.

Dr. Sluder reviewed his observations on the nasal ganglion which were summarized in his text "Etiology, Diagnosis, Prognosis and Treatment of Sphenopalatine Ganglion Neuralgia" (Transactions, Section Oto-Laryngology, American Medical Association, 1913). One point only was added to this text, namely, the very great difficulty incurred sometimes in effecting a cure of that neuralgia is explained by the fact that hyperplastic sphenoiditis underlies the disorder and may frequently be overlooked because the picture in the nose is not very striking and that the pain is very much of the time a pure ganglionic neuralgia. Such cases require careful selection to decide whether they be injected or take the Hajek postethmoidal radical operation. To the already described picture he added the "Sympathetic Syndrome," which in its fullest development is characterized by great sneezing, watery discharge and swelling of the nose within and without (rosacea), with profuse lacrimation, reddening and swelling of the lids, dilatation of the pupils with the appearance of slight exophthalmos (staring), a sense of itching and burning, or a feeling of wind blowing into them, together with a peculiar sense of discomfort, which seems independent of secretions or congestion; and more or less photophobia, sometimes very great. In addition to these symptoms, there are sometimes dyspnea with dry râles. He found that cocainization of the nasal ganglion relieved this symptom complex. He observed furthermore that it was often subdivided, sometimes being merely the sneezing, sometimes red nose (rosacea), sometimes secretions, lacrimation and photophobia. He stated that many of the ordianry coryzas are of this type, which of course are to be differentiated from affections of the membrane leading to suppuration of the sinus. He recommended the same treatment as previously given for the neuralgia syndrome. He offered a probable explanation based on anatomic and physiologic facts. Anatomically, the fibers of the cervical sympathetic from the nasal ganglion pass downward by way of the

Vidian and carotid plexus to the cervical sympathetic and give branches to the cervical nerves and to the lower cervical ganglion, which is often fused with the first thoracic. These ganglia are anatomically allied to the nerves which, in addition to supplying the neck, also make up the brachial plexus and supply the upper extremity. Accelerator fibers for the heart and vasomotor fibers for the lung also pass through these ganglia. He felt that it was a lesion of the sympathetic elements of the nasal ganglion which explains not only these vasomotor secretory phenomena, but also the pain referred into the neck, shoulders, arm, etc., as Vidian neuralgia, and that it came to pass by virtue of the sympathetic fibers which aborize about the cells of the spinal ganglia of the nerves which make the supply of the neck and upper extremity. He also offered as explanation of nasal asthma the fact that accelerator fibers for the heart and vasomotor fibers for the lungs pass through the lower cervical and first thoracic ganglia, through which also pass the cervical sympathetic fibers, and that the pain of angina pectoris might be explained by impulses arising in the heart passing upwards through the above mentioned ganglia, which are in association with the brachial plexus. He found that the pain of glaucoma, iritis, corneal ulcer, keratitis, conjunctivitis was controlled by anesthesia of the nasal ganglion, and that it was a nerve blocking process. He thought that it was the sympathetic that transmitted the "heavy pain" from these lesions which went into the occiput and the neck, and found that the course of some of these diseases was benefited by the control of the pain, and wondered if some trophic influence were not also exerted through these paths. He had at times succeeded in stopping the râles by cocainization of the nasal ganglion on the same side on which the nasal ganglion was cocainized in some cases of asthma of not too great severity.

DISCUSSION.

DR. HARRIS P. MOSHER, Boston: I think Dr. Sluder will remember that in a conversation some years ago I made the remark that somebody, some day, would do something with Meckel's ganglion, and straighten us out about hay fever. I have been waiting for someone to do this. Dr. Sluder has done it, and I congratulate him upon that achievement. Two years ago Dr. Matthews, of the Mayo Clinic, came to Boston and said he had been having great success in curing headache due to closure of the frontal ostium, and had cured hay fever by the cauterization of the two sides of the middle turbinal. I doubted that this was as he said it was; I did not adopt the procedure. He came back to Boston and I asked him about it; he said he had been curing frontal headache, asthma, and hay fever. After two years of knowledge of that procedure I began to try it in the clinic at the Massachusetts General Hospital. Cauterization of the outer and inner surfaces of the middle, followed by the application of adrenalin, was successful. I could not see then how it worked; I do see now, thanks to Dr. Sluder.

Dr. Sluder, closing the discussion: Answering the question asked by Dr. Freer, as to where I make the injection in order to get at the nasal ganglion: The sphenopalatine foramen is situated immediately posterior to the posterior tip of the middle turbinal, and absolutely never varies. It is at that point that I make the application. In this kind of cocainization I prefer to take the slightly curved applicator and curl around. For total cocainization of the ganglion I prefer to slip the applicator under the point and approach it thus. It takes a tiny bit of cocain, and the applicator under the turbinate can be left in place. For operative purposes I leave it under the tip. For the sympathetic acute syndrome I simply paint it, and paint again if necessary. It is astonishing to see the effect of the cocain. I use a saturated solution of cocain, by preference the large crystals. The large crystal is freer from poison than the rest. A poison is left in the mother liquor. The small crystals come out first, and then the big ones, which are freer from poison. The ganglion is almost submucous in many skulls. With the Holmes pharyngoscope I can see how I am going. I prefer a straight needle under the tip.

Report of Progress of a Case of Pituitary Tumor Reported in 1914.

By T. H. Halsted, M. D.,

Syracuse.

At the last meeting of this society I reported a case of cyst of the hypophysis, occurring in an Italian girl, nine years of age, upon whom I operated, following the method of Hirsch, doing the operation in three stages under cocain anesthesia.

This child came under my observation for the first time on February 6, 1914, fifteen months ago, at which time she presented briefly the following symptoms:

She was very large for her age, marked and increasing adiposity; skin was dry and harsh; hair dry and coarse, growing low on the forehead; eyes large, pupils dilated; marked general ataxia with intention tremor, chorieform movements; well marked athetosis; paralysis of the pupil; deep and superficial reflexes not altered. There was extreme difficulty in making coordinated movements, gait was unsteady, complained of frequent dizzy spells, headaches were very severe nearly every other night, and the sight was decidedly impaired. She was unusually bright mentally. An X-ray showed the sella turcica to be somewhat larger than the average normal at this age, while above and posterior to the sella the brain area was of lessened density.

All the operative work was under five per cent cocain with 1-2000 adrenalin, and was done in three stages, the last stage consisting in incising the tumor, which proved to be a cyst, liberating about one-half an ounce of clear, limpid, straw colored fluid, and was followed by quite a decided change in the symptoms.

The child recovered from these operations, finally being taken to her home in a neighboring village three months after the last operation, on the whole not improved by her surgical experience, the cyst having evidently refilled. The parents declined further operation, and I have seen her only two or three times, as I have gone out to see her at her home. Pituitrin was given her for several months, but for six months she has been without it. Her present condition is as follows:

Child is now ten years of age and is confined constantly to bed. Muscular weakness is so great that she cannot walk unaided, and to assume the upright position must be literally held or propped up. She can sit up in an arm chair or rocker with arm and head supports. There has been an enormous increase in adiposity, the fat being distributed throughout the body, while her head has increased to a size that for her age is almost huge. Comparing the measurements of her head with that of two sisters, one a year older and one a year younger, it is found that the measurement of the circumference on a level with the parietal eminences is in the older child twenty-one inches, the younger, twenty and three-fifths inches, while the patient's head measures twenty-five inches. The vertical measurement of the circumference under the chin, back of the ears, taking in the parietal eminences, is for the older child twenty-three inches, the younger, twenty-three and one-half inches, while the patient's measurement is twenty-six and one-half inches in this circumference. While the patient's head was larger than normal at the time of operations fifteen months ago, the increase in size since that time has been most striking. The color of the hair is a very dark brown, has not increased in coarseness, and the tendency to become reddish, as a year ago, has ceased. There is a marked tendency to somnolence most of the time, the child sleeping a great deal during the day as well as night, although for some days and for a week or two at a time this may not be the case. She is unable to feed herself because of the incoordinated movements and the lack of muscular strength. Intention tremor is very marked. She cannot wipe her face because of the tremor nor approximate the finger tips; or attempting to stand alone the foot is drawn inward and upward, in the position the foot would assume in standing on the outside of the foot. She is unable to hold her head up unaided, apparently due to lack of muscular strength.

The cranial nerves are apparently normal excepting the optic. Reaction to light is much impaired. Pupils are not widely dilated. She can distinguish fingers at six feet. The motor nerves all functionate, but are weak. She can distinguish heat and cold. Reflexes are exaggerated. Babinski is marked. There is apparently no great increase in the amount of urine, though it is frequently passed involuntarily. Stools the same. Speech is difficult and thick. Memory does not appear to be very greatly impaired. For instance, she asked by name after many of the patients and nurses she had not seen in fifteen months. On examination of the nose it is found that the base of the sella, covered by the mucous membrane, is freely seen, the anterior wall of the sphenoid being absent. It would be a very simple matter to reincise the tumor if the parents' consent were granted, or if it seemed advisable to do so. I have not urged an operation because of the almost certainty that the cyst would soon fill. The accompanying photograph gives a very clear picture of the child's general appearance.

DISCUSSION.

Dr. John F. Barnhill, Indianapolis: I have employed the Cushing method, using the Cushing retractors. After the parts are dilated the septum can be taken away for the purpose of getting at the anterior wall of the sphenoidal sinus. After that the nose can be dilated as much as needed. This gives a clear-cut view of the field. The Cushing retractor and dilator are absolutely necessary. The speculum itself is built very much like the old Marion Sims bivalve speculum. The operator is not hindered by any hands being in the way. The method is very commendable.

Dr. Halsted, closing the discussion: I have never seen the Cushing operation, so I cannot compare the two. The method which I employed involves a little operation which West originally did, and to which Coffin called attention—that is, doing the submucous and going on up to the rostrum of the sphenoid. In the second operation the posterior end of the septum was taken off completely, mucous membrane and all. That gave a tremendous field. The advantage of this method over Cushing's is that it can be done under local anesthesia, in two or three stages, and one gets as good view as is necessary.

History of a Tumor of the Pharynx Eventually Terminating in Sarcoma.

By Ralph Butler, M. D.,

Philadelphia.

A healthy married woman aged twenty-one years developed a series of pharyngeal tumors which were apparently cured four times in the course of two years. The first attack yielded to inunctions and protiodid of mercury. An almost fatal attack was relieved by iodid of potassium, mercury and neosalvarsan. In two other recurrences, the X-ray treatment was used in addition to the mercury, iodid of potassium and neosalvarsan. The Wassermann reaction was weakly positive at first, and the luetin reaction was positive. The first microscopic examination suggested syphilis, the second, small round-cell sarcoma. The autopsy showed small round-cell sarcoma with beginning metastasis.

DISCUSSION.

Dr. George L. Richards, Fall River: A certain number of sarcomas of the upper air tract seem to spontaneously disappear, or to be influenced by remedies which it hardly seems to think would have any curative effect. I recall a case of sarcoma of the right upper jaw, in a woman fifty to fifty-five years of age, a boardinghouse keeper. The diagnosis of sarcoma of the antrum was made by a laryngologist of ability, and this was confirmed by general surgeons. She was being treated with Coley's fluid when she fell into the hands of a Christian Science healer, and the tumor disappeared. I have seen her four or five times in association with a general surgeon. I have tried to get the opportunity of examining her again, but she is still under the control of the Christian Science healer.

Dr. G. Hudson Makuen, Philadelphia: I had the privilege of seeing the patient mentioned by Dr. Butler during the interval of the fourth time that she appeared to be cured. I think no one who was present at that meeting thought of the probability of a return of the trouble. She had nothing in the throat except a considerable amount of scar tissue and the cicatricial contractions, as described by Dr. Butler. Her breathing and articulation were fairly good. It was a surprise to us all when she reported her death at the following meeting.

Dr. George A. Leland, Boston: I was called last winter to see an old lady, seventy-three years of age, who had enlarged glands in the neck. I made the diagnosis of lymphosarcoma. She was put under treatment with Coley's fluid, and he writes me that the tumor has entirely disappeared.

Dr. Harmon Smith, New York City: We should not depreciate the benefits of Coley's fluid. I recall a case of sarcoma of the antrum occupying the entire nasal cavity and projecting outward. There was lymphatic involvement, and the case seemed hopeless. It was pronounced sarcoma by the pathologists. I said the only thing we could do was to operate, and that if he died on the table it would be the most satisfactory termination of the case. The patient went to the General Memorial Hospital, was put under treatment with Coley's fluid, and the sarcoma entirely disappeared.

Dr. Henry L. Swain, New Haven: Whether the disappearance of these tumors is due to tumor transformation, as has been suggested, or to the agents employed, the fact is that we stand with reference to them in the position of strict empiricism. This applies to Coley's fluid as much as to anything else. If we could collect all the observations on the subject, we might then have something to go by; until that is done its use will always be empirical. I have two cases in which it seemed to do good, and many others in which it accomplished nothing.

NEW YORK ACADEMY OF MEDICINE, SECTION ON OTOLOGY.

Meeting of May 14, 1915.

Suction Tubes.

Dr. Harold M. Hays said that the instruments which he presented consisted of a set of six tubes, and were used in the eustachian tubes, pharynx, nasopharynx and the nose by means of the suction pump. They were simply glass tubes blown in such a way that there was a little place which was used as a container for the secretions. The suction was not started until you put your finger over the hole which closed the entire glass tube. It was extremely efficacious in cleaning out secretions from around the middle turbinate and from the ear. There was nothing particularly unique about them, Dr. Hays said, except that they did the work very nicely. The most important of them was the nasal suction tube; the second the aural tube; third, the tonsillar tube; fourth, the eustachian tube; fifth, the nasopharyngeal tube, and sixth, the pharyngeal tube. The tip was attached to the Sorensen suction apparatus and could be used very easily. To clean them out the compressed air was just blown through in the opposite direction to which the suction was used. They were manufactured by Sorensen, who makes the suction pump.

DISCUSSION.

Dr. Isidore Friesner said that Sorensen had made for him a suction apparatus somewhat on this style, that he would show at the Section on Laryngology at its next meeting. The purpose, or rather the reason, for its being devised was this: In using suction they took an ordinary catheter that led from the suction bottle, and the material that was sucked out from the ear or nose was drawn into this suction bottle through a long tube, about five or six feet long, and cleaning the bottle and tube was a very disagreeable job. Dr. Friesner had Sorensen make a metal container which looked something like a milk can, into which was ground a stopper. At one end of the stopper a catheter was fastened, and at the other end the rubber tube leading to the suction bottle was fastened, so that the material from the nose, throat or ear is sucked into this milk can, which can be kept clean and sterilized. In this way he said he had avoided the necessity of cleaning out the bottle and the tubing that leads from the catheter to the suction pump.

Dr. John Guttman said he did not see how one could get the ear air tight by the use of these tubes. He sometimes used Sigel's otoscope, which is quite efficacious in such cases, as one could get the ear air tight, or one could get a hyperemia which could be of some effect, but he did not understand how Dr. Hays got an air tight space with these tubes.

Dr. Ernst Danziger said he wanted to ask the same question, because he had had the experience that when he took the suction apparatus of the Sorensen pump, the patient could not stand the negative pressure, and even complained about the suction from the ear, and he wondered how you could regulate the amount of suction. He had not succeeded in sucking matter out without endangering the patient.

Dr. Hays said his object in making these tubes was to clean out secretions and not to get any particular suction in the nasal cavities or the ears. With the small tubes that he used for the nose and ear, if one had a case of otitis media purulenta acuta, one did not have to get up near the drum at all. One could easily keep an eighth of an inch away with the tubing. Of course, he could not create a hyperemia with these tubes. He had used them in a frontal sinus case where the secretions were drawn from the middle turbinate. He thought the electric suction pump was sometimes a pernicious thing to use, and would advise the use of a water pump, which would do the work more easily than an electric pump.

Dermatoses of the Auricle.

Dr. Paul E. Bechet presented the following cases:

Lupus Erythematosus.—This man, H. P., was thirty-six years old, and presented the disease in its early and untreated state. It had been present for one year; its later manifestations were absent. The lesions were mostly confined to the nasal and aural regions.

Lupus Erythematosus.—P. Z., male, adult. The lesions in this case first appeared on the nose about two years previously; the face and ears became involved shortly thereafter. Six months previously the disease invaded the scalp. The eruption was a very extensive one, covering a considerable area of the face and scalp. A biopsy showed a hyperkeratosis of small round cells in the corium and scattered lymph spaces. Round cells were also seen around the sweat glands. Carbon dioxid snow and iodin had been used externally.

Lupus Erythematosus.—This was a case of lupus erythematosus in a colored boy, W. B., aged twenty years. It had been present for six years. The condition was a very extensive one, the ears being considerably involved. The case was presented in order to show the marked difference in color which the disease presents when it occurs in the negro race.

Lupus Erythematosus Disseminatus.—A. O., male, adult. This case of lupus erythematosus was of the disseminate variety, a patch of the disease being present on the chest. The eruption was very extensive and particularly noticeable over the mastoid region. The lesions showed the peculiar retrogressive changes which usually take place when they are treated by means of actinotherapy. The patient for the past year had undergone very frequent exposures to the quartz-mercury lamp, with apparently considerable benefit. The eruption had been present for six years.

Psoriasis.—This patient, female, adult, was thirty years old and had had her then present eruption for the past seven years. It had fluctuated in its degree of severity, but had never entirely disappeared; at the time of presentation she claimed it was at its worst. It was, as could be noticed, very extensive. She was, as is quite ordinary in this disease, in general good health. The eruption consisted of dry, scaly, infiltrated, irregular placques, covering most of the face and scalp. On the body it was much more discrete in distribution. The face was a very infrequent site, and it was rather unusual to see it so greatly affected as it had been in the present instance.

Leprosy.—The patient, a Greek, aged thirty-seven years, stated that the disease had first become manifest three years previously; since then there had been a steady increase in the symptoms until he came under observation some six months before. He had been living in the United States. The disease was of the mixed type, there being marked areas of infiltration on the face and ears, with nodules and anesthetic areas on the hands. The condition had greatly improved under chaulmoogra oil. When first seen the disease was distinctly nodular, the auricles covered with tubercles and infiltrations, and the face had assumed a leonine appearance. While the condition had largely ameliorated, enough remained to possibly prove of interest. Lepra bacilli were found on biopsy. The Wassermann reaction was negative.

Tuberculid.—S. K., adult, male, aged twenty-two-years, stated that he had first noticed the eruption about two years previously. It had since slowly progressed to its then present appearance. He presented for examination a large number of nodular lesions covering the auricles. Some of the lesions were crusted, others seemed to be undergoing central necrosis, and still others tended to vesicular formation. On the back of his hands could be seen several annular lesions of the granuloma annulare type.

Cicatrix Following Prolonged X-Ray Exposures.—The patient, C. H., sixty years old, had received prolonged exposures to the X-ray ten years previously for a lupus vulgaris of twenty-five years' duration. The lupus had apparently entirely disappeared, leaving the then present atrophic, cicatricial, telangiectatic area, involving the ear and covering most of that side of the face. The reddened scaly lesions above and beneath the eye had been present for the past four months only, and were eczematoid in nature.

Paper: Temporosphenoidal Abscess With Unusual Complications.*

By John Leshure, M. D.

DISCUSSION.

Dr. Thomas J. Harris said he wanted to refer to the case of Dr. Leshure, but only in a general way. The report of Dr. Leshure's case impressed him most by its conclusion. Unfortunately, no autopsy had been obtainable. It seemed to him that we had all been laboring under a tremendous handicap in developing careful and scientific otology in this country. That handicap was our inability to carry cases to a proper conclusion, to check up their results and know exactly what might occur. This was not the first time that reference had been made to this, but those present who had had the privilege of working in the foreign clinics and seeing the advantage they had in them, how they are able to confirm or disprove their clinical findings on the postmortem table, knew what he meant. He did feel that it was a subject of such great importance, that at a proper time this section could very properly cooperate with other sections in endeavoring to establish in the hospitals of this city some rule or regulation that for hospital patients and ward cases there should be a release signed, so that such cases will have given their consent to an autopsy in the case of a fatal result. Until this was secured Dr. Harris did not see how they could arrive at the satisfactory conclusions with regard to brain abscesses and other intracranial conditions. That when they did get this far they would accomplish more than in any of the years gone by, because they would be able to draw accurate, definite, clear conclusions, and not as in Dr. Leshure's case, which he had studied clinically only, but where the clinical findings could only be a part.

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*See page 854.

Dr. John Guttmann said he would like to know on what side the abscess was. It seemed very hard in these cases of the right side to make the proper diagnosis, and probably this was the reason why the result was fatal.

Dr. John Leshure said he would like to ask if any of the gentlemen had seen a phenomenon like the one he spoke of. In speaking to Dr. Faber, the latter said he had seen it in one case, that it certainly seemed unusual that the symptoms should be on the side of the lesion.

Paper: Report of a Case of Multiple Abscess of the Brain—Operation—Recovery.*

By John Guttman, M. D.

DISCUSSION.

Dr. John R. Page said that he would like to ask Dr. Guttman if he found the abscess at the first introduction of the director, or whether it was found after one or two explorations in different directions had been made.

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*See page 858.

Dr. John Guttman said that it took several explorations before he found the abscess.

Dr. John R. Page said the reason he asked the question was because the case seemed to illustrate a point made by Dr. Kerrison in his book by means of a diagram showing the possibility of creating pathways of infection for the formation of secondary abscesses by exploration in different directions with a director through the same opening in the dura where the abscess is not located at the first exploration, the pus from the abscess flowing over the openings of the previous explorations, forming abscesses later on. He thought some of the gentlemen recalled this diagram, and possibly it was an explanation for the secondary abscesses in this case.

Paper: The Bacteriology of Acute Otitis Media and Mastoiditis and Their Complications—Blood Cultures.*

By James Garfield Dwyer, M. D.

DISCUSSION.

Dr. W. L. McFarland said that in connection with organisms found in the mastoid cavity it was interesting to recall the study of the bacteriology of acute middle ear infections by Karl Süpfle, at the University of Heidelberg, in 1906. Süpfle found in examination of fifty-seven cases that some form of streptococcus was present in forty-five of the number. As six were designated as Tubenkatarrh, the percentage of positive streptococcus cultures was higher than it at first seemed. Though these cultures were made with material drawn with great care from the middle ear by means of a sterile capillary pipette, staphylococci usually manifested themselves on the plates. Süpfle's classification of the streptococci is an old one, and it would be interesting to reclassify his results for comparison with those of Dr. Dwyer.

Dr. Dwyer's emphasis on the unreliability of the average culture made from the ear canal was very timely, for it seemed not to be sufficiently recognized that numerous rapidly growing but nonpathogenic organisms, frequenting that locality, usually choked out on culture plates those pathogenic bacteria which they sought to grow.

As cultural methods became more refined the percentage of positive blood cultures increased, though the day when the ratio of bacteremias to bacterial infections was ascertained seemed far distant. Dr. Dwyer's views concerning the significance of negative blood cultures appeared to be those held by the majority of men who did such work, as were also the reasons he gave for their being obtained. As an illustration of the diversity of opinion on this subject, it was maintained by Schotmüller of Hamburg that negative cultures are frequently due to failure to cultivate anaerobically, and other bacteriologists said that plates were not incubated a sufficient length of time. In opposition, Neisser says that anaerobic streptococci as mentioned by Schotmüller have practically never been obtained at his institute, and many bacteriologists held that after a certain length of time in the incubator bacteria would autolyze rather than multiply.

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*See page 861.

Dr. McFarland said that the section was to be congratulated in having presented to it by Dr. Dwyer such a lucid and logical paper on a very vital subject.

Dr. E. Libman said the only point he wished to make was the following: In all the publications which he had made, including the ones with which Dr. Cellar was associated, the statement was made that they had not had any cases of pneumococcus sinus thrombosis. That statement needed a certain amount of alteration at the present time, because they had found two cases in which atypical pneumococci were found which have produced the sinus thrombosis. When a pneumococcus changes into a streptococcus, their experience had been that the first change that occurs is that the pneumococcus becomes insoluble in bile and then acquires a power of what they call precipitation (that is, the power of precipitating proteid in agar containing serum and glucose). They could state their experience at the present time in the following way: They have never seen a bile soluble pneumococcus produce a sinus thrombosis, but they have seen sinus thrombosis produced by pneumococci which had changed more or less over to streptococci.

Dr. Daniel S. Dougherty said he might cite a case he operated upon a week ago that day, to emphasize the statement of Dr. Dwyer, that negative findings might be due to a walling off or a damming of the pus. This case had been operated on by one of his assistants some eight days previously and the lateral sinus injured. The case jumped a septic temperature, running up to 105° and then down to nearly normal, and after that up again to 103° and 104°. Dr. Dougherty had three bacteremic examinations made, and all three were negative. He operated and stated that he did not resect the jugular. When he exposed the jugular he found it collapsed above the facial, and he merely put a ligature above the facial and then opened the sinus and found it fairly full of pus, with a large thrombus in the jugular bulb. The man is now making an uneventful recovery.

Dr. Dougherty said he had been very much interested in the work and paper of Dr. Dwyer, and stated he would like to know if the colon bacillus had been found in any of the middle ear infections. He had reported a series of twelve such cases from his City Hospital service, among which there were five cases of acute mastoiditis, one complicated with sinus thrombosis, and one by an abscess of the temporal and occipital lobes. In the cases complicated by the brain abscess the colon bacillus was found in pure culture, and in the sinus thrombosis case, mixed with a slight quantity of staphylococci. One of the cases that he performed a radical operation upon had the colon bacillus in pure culture, and one of the acute mastoids also showed a pure culture, as also one case of chronic otitis media. The others were mixed cultures. In the cases reported the material was taken from the middle ear under fairly aseptic conditions, the ear being swabbed out thoroughly and a pledget of cotton placed in the canal for some twenty minutes, the pus being then taken out with a platinum loop, put well back into the middle ear. He said he had looked over the literature pretty thoroughly and had not seen any cases mentioned of this character. Three or four days previously he had received a letter from a captain of the United States army in the Philippine Islands, who said he had seen such a case. Had any of the other gentlemen found any of these cases? Since his series he had found one isolated case. He might also add that two of these mastoids originated from a furunculosis of the canal, and were cases transferred to his service after radical operations.

Dr. William H. Haskin said that blood culture was a most interesting question, but that it was not always satisfactory. He had been thinking of two cases in particular, one of which had been reported there a couple of years previously in a boy. He came in with an acute ear, and the drum was opened, some serum coming out. Blood cultures were taken, and the streptococcus capsulatus was found in the serum. Afterwards the ear cleared up. The boy was desperately sick and ran a septic temperature. Dr. Berg, Dr. Phillips and Dr. Rae had examined him. So far as opening the mastoid, under these circumstances they did not advise operating on the boy, as there was a positive streptococcus capsulatus with no tenderness over the jugular and an acute endocarditis. They watched him for several days and he developed a focus in the right hip joint, and they gave him leucocyte extract. This improved the patient, and at the end of the fifth day a blood culture was taken which proved negative. They then continued the leucocyte extract for ten days. The temperature dropped to normal and the patient never had an operation of any kind. The hip joint remained drawn up and he was taken down to the New York Hospital, where the cavity was exenterated and two ounces of pus removed, but no examination was made to find out what organisms, if any, were present.

In another case a boy came in desperately sick, and they never thought that he would live. He had a mastoid which apparently cleared up except for a tenderness back about one and one-half inch to the knee of the sinus. Five blood cultures were negative. The X-ray showed a slight area of infection. Dr. Law said there was a thickening over the sinus. Dr. Haskin asked him if he would operate on the findings of the X-ray, and he said no. However, later he was operated on. The deep cells were practically free, but at the point of tenderness pus was found and the sinus was covered with black granulations, but it was not opened. The temperature dropped to 102° but ran up again. Then Dr. Rae suggested further operation, so Dr. Haskin opened the sinus, but no thrombus was found. The patient's temperature dropped again for a short time, and it went up again two days later, as typical septic temperatures do, to 105° and 106°. They never got the positive culture. The boy was then given leucocyte extract for five days and the temperature dropped to normal. It was then stopped for five days, when the temperature again showed sepsis, but no bacteremia was found.

The extract was again given for three days and the patient recovered.

Dr. Dwyer said that the presence of the colon bacillus in chronic ears had been reported by various observers. He himself had had several cases, and there were undoubtedly more in his series, as sometimes the organism was classed in with the group of Gram negative bacilli, included in which is the bacillus mucosus capsulatus, the bacillus of Abel, etc., and the work of Fizgerald of Toronto, done on the latest biometric methods, would seem to point to these all being members of a common family.

He was very glad that Dr. Libman was present to take part in the discussion, as so much work had been done by him along these lines. He purposely had not gone into the transmutation of type organisms, as, to his mind, the main reason for reporting the series was to bring out the importance of blood cultures for practical diagnosis.

The case of which Dr. Haskin had spoken, in which three blood cultures had been taken, was desperately ill. In the second case they could find no thrombus. There was no doubt as to the efficacy of the extract in these three cases. The results are very often striking.

He wished to thank Dr. McFarland for coming to take part in the discussion.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

Regular Meeting, Held April 20, 1915.

DR. GEORGE W. BOOT, THE PRESIDENT, IN THE CHAIR.

Case of Crushing Injury of Face.

DR. GEORGE W. BOOT exhibited a man who had met with a crushing injury of the face ten years ago, which resulted in complete loss of the nose. The man came to the County Hospital with the history of having met with an elevator accident ten years ago. The jaw was fractured on the right side. Four weeks after this accident the nose began to decay, which process continued for five years. During the last five years there has been no extension of the process, and he has been in the state as seen at present. The right eye has been removed. The nose is completely gone. The turbinates have been completely destroyed; the septum has been destroyed. The left eye is turned inward. He has only perception of light and ability to count fingers with the left eye. The patient is anxious to have his vision restored, but does not care much about the nose. Dr. Boot thought the case must be one of osteomyelitis. The man is married; has seven children, the youngest three years of age, all perfectly healthy. No history of primary lesion. Dr. MacEwen said it was not a case of lupus or epithelioma, nor did it look like a tertiary syphilis. The Wassermann reaction was faintly positive. The interesting part of this case is the extensive destruction of the nose, septum, and turbinates, without involvement of either the hard or soft palate.

Destruction of Septum Following Syphilis.

The second case exhibited by Dr. Boot was one of destruction of the septum following syphilis, and he brought this patient to the meeting to show the contrast. In the first case one particularly interesting point was the ability to see the action of the soft palate, which completely closes the nose from the throat.

Scleroma of the Larynx.

The third case had been shown to the society before by Dr. Friedberg. It was one of scleroma of the larynx. The patient has been in the County Hospital for several years. He had worn a tracheotomy tube for two years, or maybe longer, but within the last two or three months the tube had been removed, and the patient was getting along very nicely without it.

Demonstration of Glasses Used for the Observation of Nystagmus.

Dr. J. Gordon Wilson showed the method he used in observing nystagmus. He employs large frames like those used in automobile glasses. These frames cover the eyes and are opaque, except in the center, where there is placed a lens of eighteen or twenty diopters. It is essential that the sides and the rims be opaque, to prevent observation of external objects. The patient cannot focus through these lenses. The advantage of these glasses is that the observer can watch all eye movements, which are magnified, while the patient is unable to focus. The first to use glasses of this nature in a modified form was Bartels. Dr. Wilson has found them of great value. They are made for him by Hardy and Company, Chicago.

Report of a Case of Intense Vertigo Relieved by Puncture of the Dura in the Neighborhood of the Internal Auditory Meatus.*

By L. W. Dean, M. D.

DISCUSSION.

Dr. J. Gordon Wilson thought the case, so well reported by Dr. Dean, was of great interest, not only in itself, but because of its bearing on the etiology of vertigo. Dr. Wilson saw a case a few days ago in which he had operated twelve months ago for a cyst in the neighborhood of the internal auditory meatus. As in Dr. Dean's case, one of the most prominent symptoms was vertigo. After the operation and relief of pressure the vertigo disappeared and so far has not returned.

In such cases it is interesting to inquire into the etiology. This seems to be satisfactorily explained by the anatomic relations of the vestibular nerve. A process of the arachnoid space with the cerebrospinal fluid passes along the eighth nerve into the internal auditory meatus. It lies in close proximity to and is probably connected with the lateral foramen which connects the fourth ventricle cerebrospinal space with the subcerebellar cerebrospinal space. Cysts in this region are usually connected with some faulty circulation of the cerebrospinal fluid. Such a faulty circulation may arise from a previous inflammation of the meninges resulting in adhesions, or from an injury to the skull, but in a certain number of cases there is no distinct history of damage. As a rule, immediate relief is obtained by opening the cyst, though the possibility of its refilling must not be overlooked.

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*See page 867.

The question of pointing, to which Dr. Dean referred, is a question very much with us at present. We know so little about this subject that one must at present keep an open mind. It is, however, well to remind enthusiasts that pointing is a cerebral act and not a cerebellar. Further, in pointing with the eyes shut, one depends on memory for the knowledge of the locality of the object, and memory is also a cerebral function.

Dr. George E. Shambaugh stated it is interesting to note, in connection with the clinical phenomena in cases like the one reported by Dr. Dean, that the disturbance produced apparently by pressure in the region of the vestibular tract in the cerebellum produces symptoms not very unlike those which arise from certain forms of labyrinth involvement. A labyrinthitis which does not result in a suppression of function gives rise to a nystagmus directed toward the affected side, apparently due to an increase in the labyrinth tonus. A labyrinth involvement which proceeds to a suppression of function, results in a nystagmus directed toward the normal side, produced apparently by a suppression of tonus in the affected labyrinth. Now, if the infectious process proceeds to an intracranial involvement, such as a collection of fluid in the region of the cerebellar pontine angle, a nystagmus is again produced which is usually directed toward the affected side, just as if it might be due to an irritation of the trunk of the vestibular nerve; in other words, giving rise to exactly the same type of nystagmus as results from an irritation of the nerve endings in the semicircular canals.

Dr. Shambaugh recalled a case which was under his care several years ago because of an extensive cholesteatoma and labyrinth involvement. In this case the labyrinth operation was performed at the same time as the radical mastoid for the relief of the cholesteatoma. About a year later the patient developed symptoms pointing toward an intracranial lesion, had a great deal of headache and spontaneous nystagmus directed toward the affected side. An operation was performed exposing the dura in the posterior fossa, in the region of the internal meatus. This was incised and a small amount of fluid, apparently cerebrospinal, escaped. This case went on to recovery and the vertigo and nystagmus disappeared.

Dr. Joseph C. Beck was exceedingly pleased with the report of Dr. Dean, and wished to ask some questions.

First, the collection of fluid in the region he described, or suspected it came from, should have given Stellwag's symptoms, such as found in hysteria or tumors in the pontine cerebellar angle. Dr. Dean had said the fields were normal. That was interesting, in contradistinction to the cases reported, where there was such a large amount of fluid without locality.

Second, he did not hear any report as to the fundus oculi. Were there any optic disc changes?

Dr. Dean said that both fields and fundi were normal.

Dr. Beck said that the third point he wished to refer to was the question of pain. Was there much headache?

Dr. Dean said that just in the last few weeks the patient had a dull headache, during attacks, in the region of the posterior fossa. There was no pain, however, on pressure over the opening of the mastoid vein, as mentioned by Rodman.

Dr. Beck said it is claimed, in a paper by Bruggiere, based on examination of the spinal canal in internal hydrocephalus, that the only explanation of the absence of pain in a cyst or fluid accumulation which communicates with the spinal canal is that there occurs a sort of artificial syringomyelia, or spina bifida, and that, of course, the doctor could not prove in his case; but that probably explains why there was not more pain with such a large amount of fluid present.

Dr. J. Holinger wanted to thank Dr. Dean for his paper and to call his attention to the report made by the speaker at the International Congress in Boston of a case that at that time he considered a tumor of the cerebellar pontine angle.

The symptoms in that case and the conditions found were practically a repetition of what Dr. Dean had said, with the only exception that in Dr. Holinger's case there was severe headache from the start—constant headache. After the first operation he was still of the opinion that he had to deal with a cyst. Quite a lot of fluid was discharged. The patient was improved for about three years. Then she got worse again, and, acting on the presumption that he had to deal with a cyst, he advised a secondary operation, with the intention of removing the cyst. At operation, on opening up the first flap the tumor appeared and burst before a picture of it could be made. Then it was seen that the condition was an internal hydrocephalus. The patient did pretty well for several days, but then got worse and died. The speaker had a complete postmortem of the brain; he has the brain and the temporal bones from the case.

Dr. Holinger thinks that these differences in secretion of the cerebrospinal fluid are a chapter that otologists will have to help to solve. We cannot expect very much from the nerve specialists. In his case a very prominent nerve specialist gave him the absolute assurance that there was no positive sign of any brain lesion. Nevertheless, all the symptoms of dizziness and changes in the static labyrinth were present.

Dr. J. R. Fletcher thought that perhaps there is some advantage in grouping these cases more or less. He had urged Dr. Kahn to again call the attention of the society to a case he had, but as he would not speak of it, the speaker would mention it in some detail. In this case the individual had received an injury sixteen years before, striking his head in diving, and from the further history seemed to have fractured the skull. From that time hearing was entirely lost in the right ear. Afterwards there was a discharge from the ear up to the time he came to the Michael Reese Hospital. Latterly he suffered from attacks consisting of the loss of his sense of strength, and he felt as though something had suddenly occurred to him to make him unable to walk straight or to lift, or do many things requiring ordinary strength. He was exceedingly dizzy and had headaches. On further examination it was found that he had a depression of temperature, with lowering of the pulse. The temperature went down to 96.5°; pulse down to 52, and respirations were more reduced.

He had no symptoms of a cerebellar disease except one, and that was the exaggerated knee reflex on the same side. He had nystagmus to the diseased side, exceedingly small, rapid, rotatory nystagmus, easily seen when the eye was slightly shaded. He had pain on percussion over the area, and had been complaining of severe headaches during these attacks, which lasted over long periods—they were not a matter of a few minutes, but days or even weeks, growing somewhat better from time to time. The diagnosis was made of abscess in the period of latency in the sphenotemporal fossa, that meaning, of course, a cyst. Dr. Kahn, after doing a radical mastoid, which was necessary, punctured this area, aspirated it and withdrew just exactly what Dr. Dean mentioned—somewhat bloody fluid, rather brown in color. That gave further light on the matter, and the conclusion was arrived at that these attacks were due to hemorrhage into the cyst, that hemorrhage causing indirect pressure (of course, pressure being the main thing) on the posterior fossa. The condition was proven out by a second operation, in which Dr. Kahn absolutely located and explored this cyst. This man has made a complete and absolute recovery, with the exception of the hearing, which had been totally destroyed at the time of the accident, which had occurred, as stated before, sixteen years previously.

It would seem, judging by this case of Dr. Kahn's, and also Dr. Dean's reported case, that the time is limitless in which these cysts may last. They may continue indefinitely if they have not become reinfected, which brings on again the manifest period of an old abscess.

Dr. Dean, in closing the discussion, simply wished to say, in answer to Dr. Beck's questions, that he believed they were all accurately answered in the paper.

Theories Concerning Paracusis Willisii.

By George M. McBean, M. D.

DISCUSSION.

Dr. George E. Shambaugh stated that the facts in regard to the phenomenon of paracusis Willisii are very definite. A person with normal hearing experiences some difficulty in

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*See page 874.

hearing when in a noisy place; a person with nerve deafness finds increased difficulty under these circumstances. On the other hand, certain cases of deafness are very much better in a noisy place. In these cases the deafness is always due to fixation of the sound conducting mechanism, and the phenomenon is most marked where this fixation is most complete; that is, where there is bony ankylosis of the stapes.

Two possible causes suggest themselves: First, that the commotion produces a stimulation of the sound perceiving apparatus, thus making it more sensitive than normal; second, the commotion in some way improves the action of the sound conducting mechanism. Dr. McBean accepts the first view. This may be the correct explanation, and yet it does not entirely explain all the phenomena. For example, a person suffering from deafness due to fixation of the stapes will often hear much better on a moving train than does a person with normal hearing.

There is another phenomenon in connection with these cases of paracusis which is just as interesting and just as difficult to answer. This is the prolongation of bone conduction. The two are always associated, and the speaker is inclined to believe that could we have an accurate explanation of the one phenomenon, we would have an explanation of the other. The explanation of prolonged bone conduction in obstructive middle ear deafness which has been given by Bezold seems to be the most rational. His explanation is simply this: All sound waves which are capable of perception must pass through the stapes. When the stapes hangs suspended from the oval window by its normal ligaments, the impulses from a tuning fork placed on the skull are not transmitted as readily to the stapes as when this structure becomes more firmly adherent, either by bony or fibrous adhesions.

The speaker cannot get away from the idea that the phenomenon of paracusis Willisii has perhaps more to do with the sound conduction than with sound perception. It seems to him more rational to believe that the sound perceiving mechanism remains the same with the stapes locked up as with it freely movable. With the stapes fixed in the oval window a person has better bone conduction than a normal person, and associated with this phenomenon is the paracusis Willisii, whereby the person with defective hearing is often able to hear even better in a noisy place than a normal hearing individual.

Dr. J. Gordon Wilson had listened with great interest to Dr. McBean. In a paper on so difficult a subject Dr. McBean could not expect but that some member would disagree with his ideas. Its solution is of importance to otologists and must be based on the physical laws of sound conduction.

Dr. Wilson is not convinced by the arguments of Dr. McBean in regard to the cause of paracusis. He cannot see how we are going to explain the condition of paracusis by any mechanism in the cochlea. On the other hand, Dr. Wilson believes the laws of acoustics can be applied so that paracusis Willisii may be explained by faults in the middle ear mechanism. It is worth while noting that not all errors in the conducting mechanism give the symptoms of paracusis. We do not get it in cases where the stapes is fixed by masses of bone lying in the oval fossa, nor do we find it if the middle ear be full of fluid.

The popular idea in regard to paracusis is that a loud noise shakes and loosens up the adhesions of the ossicles, and to some extent enables the sound vibrations to go through with less friction. There is some basis of truth in this. In otosclerosis there occurs an inhibition or diminution in the amplitude of the movement of the stapes. Along with this we have a diminution in the hearing of low tones. On turning to the acoustic properties of sound waves, one finds that in harmonic vibrations, when mass and amplitude are fixed, the same energy may be obtained by high notes with small amplitude as can be obtained by low notes with great amplitude. We know that this is true in otosclerosis, for we require notes of greater amplitude or loudness to overcome this inhibition.

When we pass from this relatively simple fact to the consideration of the superimposing of one sound wave on another sound wave, the subject becomes more complex, but it is along these lines that Dr. Wilson believes the explanation of paracusis to lie. If when sound waves of low frequency are passing through ossicles which are restricted in their movements and there are superimposed on these sound waves of higher frequency, the latter will pass to the labyrinth with less loss of energy, and therefore be better heard.

Dr. Robert Sonnenschein asked Dr. Wilson if the energy displayed by low tones of great amplitude is the same as that of high tones with a small amplitude. Why is it that a high pitched tuning fork is heard better by air conduction than by bone, as explained by Schaeffer and others as being due to the fact that the handle of the fork has a much smaller amplitude than the prongs? With the monochord the very high tones are heard better by bone than air conduction.

DR. WILSON, in reply to Dr. Sonnenschein's question, pointed out that what he had said had to do with conduction through the air and the ossicles. Conduction through the bone was a separate problem, involving the question of resonance, and had nothing, so far as he could see, to do with the question of conduction through the air and the ossicles. He could offer no suggestions in regard to the apparent anomaly presented by the monochord.

DR. MCBEAN, in closing the discussion, was very glad that Dr. Sonnenschein had brought up the subject of the monochord. He has an interesting case at the present time, whom Dr. Shambaugh saw several years ago, and diagnosed as otosclerosis, who had just come back to the city, in whom the C_4 fork was short fifteen seconds in the right ear, and twenty seconds short in the left ear, and yet he heard the monochord E_6 by air in the right ear, and by bone, F_7. He heard an octave and a tone higher by bone in the right ear; in the left ear, D_6 by air and F_7, an octave and two tones higher. It has been a very interesting case to the speaker. It seems reasonable to suppose that the nerve is not degenerated at all, but merely out of function for the upper tone limit by air because of loss of mass vibration in the endolymph. The accepted theories do not explain the condition.

Dr. Shambaugh spoke of patients with otosclerosis hearing better in a train. That is, they hear better than a normal person during the noise, but the normal ear hears better in the quiet. That is the point Dr. McBean wished to make, that a normal ear is overstimulated by the gross vibrations, so does not hear so well, while the ear with stapes ankylosis has its lymph artificially vibrated into something approaching its normal condition. A noisy place to a normal ear is Bedlam, but to an otosclerotic is a haven of peace.

Paper: The Postoperative Antiseptic Treatment of the Tonsillar Fossæ.

BY GEORGE PAULL MARQUIS, M. D.

DISCUSSION.

DR. ROBERT SONNENSCHEIN could not say anything regarding the value of the method described by Dr. Marquis, as he had never used it, but it has always seemed to him that in children particularly there is very little discomfort after operation. In adults, on the other hand, there is considerable soreness. He has, however, always been of the opinion that it is the best surgery to leave any fresh wound alone.

DR. H. KAHN said that Dr. Marquis had spoken to him about this treatment some time ago, and that since then he had had occasion to operate on seven adults. In all the cases the results have been very satisfactory. In the first two cases he applied the alcohol and iodin to both tonsillar spaces after the removal of the tonsil, and there was practically no pain on the second day, and very little pain during the whole process of healing. In order to test the method out, he applied the alcohol and iodin to one side only, and left the other without any application. In each case in which he did this, the side to which the alcohol and iodin were applied caused very little distress to be complained of, while the other side was profoundly painful. He felt that these tests were quite conclusive as to the value of the method.

DR. JOSEPH C. BECK said that the question of exudate in these cases was exceedingly interesting to him. Although perhaps out of order, he wanted to say a few words with reference to the exudates that follow nasal operations. He has been worrying a good deal about their cause. He has always observed quite a bit of this whitish exudate after tonsil operations in children as well as in adults, and he has always treated them with iodin, applied the day following operation, but never just at the time of operation. He was exceedingly thankful for the paper of Dr. Marquis, and would immediately try his method.

He would have liked to hear the result of the bacteriologic examination—just what organisms were found in the exudate

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*See page 880.

above referred to. He has been practically unable to find any organisms in the exudates following nasal operations.

The speaker had the pleasure of seeing a case of Dr. Marquis' shortly after operation, and in this case there was practically no reaction, whereas if this case had been treated in the way he (Dr. Beck) usually does, there would have been a great deal more reaction present. It certainly seemed to be an excellent suggestion.

Dr. Marquis, in closing the discussion, in reference to Dr. Sonnenschein's remarks, said he used to think just as he does, but he found that the method as outlined seemed to give a great deal of relief, and he thinks the main thing is to give relief from pain.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

Regular Meeting, Held Monday, May 24, 1915.

Dr. George W. Boot, the President, in the Chair.

Demonstration of Frontal Sinus Cases Operated Intranasally—Cases of Lateral Sinus Thrombosis.

Dr. R. H. Good said there was only one point he wished to demonstrate regarding frontal sinuitis, and that was that cases with pus breaking through the bony walls, either on the forehead or in the orbit, heretofore having been considered as cases that should be operated extranasally, will get well when operated intranasally, which point he would demonstrate to the members by the exhibition of several patients.

The first patient shown had severe headaches a number of years ago, with frequent swelling just above the eyebrow, near the median line. About two years ago she came to Dr. Good with an acute frontal sinuitis, with somewhat of a swelling in this same region, and he tried everything in the line of medical treatment, without relief to the patient. Finally he removed the middle turbinate, which seemed beneficial at the time. His experience with removal of the middle turbinate in cases of acute frontal sinuitis, however, has not been very satisfactory. In this last attack he tried frequent suction, after cocain and adrenalin sprays, and so forth, but the patient got gradually worse. The patient was incapacitated. He finally operated, which was followed by immediate relief from pain and a disappearance of the swelling. The pus had broken through the anterior sinus wall. The operation was performed intranasally and drainage established.

Case 2.—In this case there was no question that there was pus underneath the periosteum, with marked swelling of upper lid. The intranasal operation was performed, and the pain disappeared altogether. It took a few days for the eye to open to its normal size and condition. The sinus was washed out ten or twelve times.

Case 3.—In this case also the pus had broken through the bony wall of the sinus. This was one of the most interesting cases the speaker has had. When he first saw the patient the left eye was pushed partly out of the socket. The tissues above the eye were so swollen that it was impossible to open the eyelids. The patient was confined to bed. As the ordinary patient with sinuitis is not confined to bed, this made him think that he had to deal with a very serious condition, and he advised operation immediately. The patient had to be taken to the hospital in an ambulance. He did the intranasal operation and got very nice drainage. However, the patient did not get well. He continued to have subnormal temperatures, occasional vomiting; inability to concentrate the mind, and he could not feed himself. The diagnosis was made of extradural abscess. Operation showed a perforation from the sinus into the orbit, but the posterior wall was absolutely solid, and no perforation. Dr. Good then opened up the posterior wall, removed an area the size of a quarter of a dollar, and got at least a dram of pus. The point he wished to bring out was that the pus did not go through the posterior wall of the sinus but came into the orbit, and then went back between the periosteum and the bony orbit, through the posterior orbit, and then came forward under the dura. That was the only way he could explain it being in the extradural space. This patient would also have been cured by the intranasal operation, had he not had the extradural abscess. There is no discharge at the present time, and the patient is feeling fine.

Case 4.—This case the speaker was very proud of, and had expected to show the patient, but had received a letter that she could not come. She is a doctor's daughter, who had had a frontal sinuitis for seven months, with a fistula opening just above the inner canthus of the eye. He showed the picture taken of the case when first seen, showing the sinus just above the inner canthus of the eye. He operated on this patient, and in twenty-four hours she had absolutely no discharge from the fistula, and at the present time it is still closed—a year and a half after operation—so that a sinus draining from the frontal sinus is not a contraindication to the intranasal operation.

Case 5.—This patient also developed an abscess just above the inner canthus. It broke open. He did an intranasal operation with some difficulty. This healed, draining through the nose, and the patient got perfectly well. There is a slight scar, which can be seen on the picture.

Case 6.—This is a lateral sinus case. The patient developed an acute rhinitis. He left his work with chills. Later developed an acute otitis media in both ears. He was sick for four days before the membranes ruptured. He was treated for about a week with the usual treatment of a general practitioner, but the patient got worse and worse. The tongue was coated, poor appetite, temperature slightly elevated at times. The speaker was called at the end of a week. He could not elicit any tenderness over either mastoid. There was no tenderness along the sinus. The discharge was most profuse from the left side. He had the patient put in the hospital and had the temperature taken every hour, which he has found very valuable in making a diagnosis of lateral sinus thrombosis. After two days there was no question as to the diagnosis—it was a lateral sinus thrombosis. It is very important in these cases to watch for chills. Sometimes these patients do not have real chills—just the hands and feet will get cold, or the patellar region will get cold or damp. In this case, after the temperature went up to 104°, he had chills and perspiration; also some projectile vomiting.

Dr. Good has only had five cases of lateral sinus thrombosis in his practice. He gave the details of the operation performed in this case. The patient is getting along very nicely. In operating he has noticed that in every case where he has simply ligated the internal jugular vein it ruptures in three to five days after it is tied. He believes it is wise to separate the vein and sew the upper end into the wound, so that it can be irrigated through and through.

This patient had a leucocytosis of eighteen thousand; the polymorphonuclears were eighty-five per cent. Autogenous vaccines were given throughout the entire course of treatment in the hospital.

Dr. J. C. Beck asked what organism.

Dr. Good replied that it was the staphylococcus aureus.

Case 7.—This was another case of lateral sinus thrombosis, and in this patient you could see the mastoid region bulging. He was treated in a dispensary for five or six weeks, and was not operated because there was no discharge from the ear at any time. There was never the least disturbance with hearing of which the patient knew, and yet there was a lateral sinus thrombosis. The infection did not go through the jugular bulb because the sinus was perforated in the mastoid region. On opening the mastoid the lateral sinus was found thrombosed, with a large perforation. In addition, there was an extradural abscess. When the mastoid was opened the pus came out of the cranial cavity, with pulsations. Today the patient has perfect hearing. In this case there was no perceptible systemic infection, and the patient recovered nicely.

Case 8 was the case of a nurse who had had an acute tonsillitis, which was treated by a general surgeon in a hospital. Four days after, she developed an acute otitis media, with tenderness over the mastoid. At this time the speaker was called. He did a paracentesis, and there followed a profuse discharge from the ear—about a cupful in two hours' time. He gave her urotropin, and so forth, in the hope that the condition would subside, but four days afterwards he realized that the mastoid was becoming more tender, and so he performed a mastoid operation. He found the lateral sinus uncovered, the bone necrosed over the sinus over a small area, but he did only a complete simple mastoid operation. Within a week she had distinct symptoms of lateral sinus thrombosis. The lateral sinus was operated on, the internal jugular ligated. There was no pneumonia at any time, and yet she had multiple abscesses all over the body, about fifty in number. Patient recovered in six weeks after last operation.

(Lack of time prevented Dr. Good from describing these cases in detail.)

Growth in the Left Choana.

Dr. Norval H. Pierce said this man complained two months ago of nasal stoppage on the left side. There was no pain of any consequence. On examination the speaker found that the left choana was deformed by a growth which apparently sprang from the immediate vicinity of the posterior end of the inferior turbinated body. When first seen there was no ulceration, but an induration in the region approximately close to the inferior and middle turbinated body. This infiltration could be very easily seen to travel upwards toward the upper portion of the eustachian tube. The second time the speaker saw him, some days after, there was a distinct increase in this infiltration, and at that time the infiltration had what he determined to be a slough on its upper portion. The turbinated bodies were then so amalgamated in the left choana that he could hardly distinguish between the posterior end of the septum and the middle and inferior turbinated bodies. The growth apparently was very rapid. He succeeded in snaring off a portion of what he considered the most prominent portion of the growth, about the size of his fingernail. This was submitted for pathologic examination, and showed nothing but granulation tissue. Toward the circumference of these pieces of tissue he found something that was rather suspicious of epithelial growth. The pathologist was not sure whether it was epithelium or endothelium, but could see nothing that he could positively state to be malignant in its character. The man had no history of syphilis, but in order to insure the absence of this disease he was put on antisyphilitic treatment, with absolutely no effect on the growth. Tonight, on examination of the postnasal space, this infiltration was found to have spread rapidly over the posterior wall of the posterior pharyngeal space as a large ulceration with heaped up edges.

This is the second case of the kind that Dr. Pierce has seen in this region, and they all go about the same way.

X-Rays of an Interesting Case of Foreign Body in Nose.

Dr. Pierce was unable to show these plates, as they had been taken from the hospital in order to have photographs made of them. The case had been referred to the clinic by the school officials for the purpose of having the tonsils and adenoids removed. The tonsils were found to be healthy, and there were no adenoids. The child could not breathe through the nose properly. On the right side there was considerable swelling and discharge of pus. A foreign body could not be seen by anterior or posterior rhinoscopy, but the X-ray showed a large safety pin somewhere in the posterior portion of the nasal cavity.

Case of Nasal Deformity From Syphilis, With Suggestions as to Remedying the Defect.

Dr. Pierce said that the deformity had resulted from a syphilitic process which had healed up. In this case the Wassermann was negative. The next proposition, however, was to improve the man's appearance. Dr. Pierce's idea is to take the middle finger of the left hand, split it up and sew the split finger into the cavity in this way (indicating). This is not the usual technic, but he thought it might be successful. He wanted to know if any of the members had any suggestions to make regarding the case.

Case of Frontal Ethmoidal Disease Operated on by the Killian Method, With Accentuation of an Important Point.

Dr. Pierce said that in this case the whole temporal region was very much swollen. The patient was shaved very thoroughly before he saw her on the table, and therefore he could not tell where the eyebrow was. Since the operation the eyebrow has sprung out very beautifully, over an inch above the incision. This displacement was the result of the great swelling present. The point is very important that in these enormous swellings it must be that the attachment of the orbicularis and the occipitalis has become entirely eaten away from the bone; the muscle contracts and throws the soft parts upwards. He has never seen this fact brought out, however, and exhibited the case because of its interest.

Case of Acute Frontal Abscess.

Dr. Pierce also showed a case of acute frontal abscess, with violent pain, which continued for many weeks. The patient was sick for about five weeks. In operating, he went in through the ethmoid, up into the frontals. The patient is feeling better now. The pain was greatly relieved by this intranasal operation.

DISCUSSION.

Dr. J. Holinger asked if it was an especially deep frontal sinus, as shown by the X-ray.

Dr. Pierce replied that he did not think it was especially deep, and he did not think there was anything special about the X-ray other than that it showed that the sinus was diseased.

Case of Paralysis of Vocal Cords of Doubtful Origin, Probably Lues.

Dr. Charles H. Long said the interesting point about this case is its cause—whether it is tubercular or luetic. He exhibited the X-ray plates, which showed the external laryngeal on each side, demonstrating the difference. The patient is fifty-five years old, and came to the speaker last January on account of the loss of his voice. Otherwise he was apparently in good health. The past history is that in 1907 he came under Dr. Walter Barnes' care for what seemed to be tuberculosis of the lungs. He had some hemorrhage, slight cough, some expectoration, and epileptiform fits. He told Dr. Long that these fits extended over a period of eighteen months. The hemorrhages were not like the ordinary lung hemorrhages. They came on after doing some strenuous work, and were only three or four in number. Dr. Long spoke to Dr. Barnes over the telephone about the case, and he said that he had had a tuberculin test made when the man was under his care, and had the sputum examined, both of which were negative. The patient recovered under antisyphilitic treatment. Dr. Barnes was of the opinion that it is a case of lues. The man was perfectly well until 1912, when he had an attack of sciatica which laid him up for four weeks. One day last November, when he got up in the morning he could not talk. This condition continued until he came to the speaker in January. A tuberculin test at that time was negative. He was put on antisyphilitic treatment, and a Wassermann was made. The Wassermann showed twenty-five per cent positive. He was given salvarsan. Then an examination of the lungs was made.

The interesting feature in this case is the differential diagnosis of the man's lung condition. He has had a positive Wassermann test, so it was necessary to consider the possibility of lung syphilis. The diagnosis is not by any means easy in the fibroid stage of either disease. We know that a positive Wassermann may be found in a tuberculous individual, without evidence of syphilis being present. We know that syphilis is one of the predisposing factors in tuberculosis. This man may have both syphilis and tuberculosis. The physical examination of the left apex posteriorly shows a mildly active lung lesion—undoubtedly tubercular. No evidence was found of active trouble in the right lung; no râles present, which could be accounted for by the fibroid condition of the affected portion of his right lung.

Syphilis of the lung is a comparatively rare disease. This man's condition is much more suggestive of tuberculosis than lung syphilis. He has had no temperature, pulse normal; during the last winter lost about fifteen pounds in weight; no cough, no night sweats, none of the symptoms of tuberculosis. As stated before, he has had salvarsan, and is now taking forty grains, t. i. d., of iodid potassium. He has had inunctions, and says that he is gaining about a pound a week.

The diagnosis made by Dr. Long was syphilis, partly on account of the treatment by Dr. Barnes and the improvement that has taken place under antisyphilitic treatment. The voice is improving, which improvement began about six weeks ago. Of course, the left cord was the one affected, and it might be that three, four or five mediastinal glands might be enlarged because of this, but no other glands were found. The picture does not show any consolidation on the right side, and there is a picture of consolidation on the left side.

DISCUSSION.

DR. KEITH asked what the cords looked like.

DR. LONG said that there was just a paralysis of one cord. This man's mother died of tuberculosis or some lung trouble, of three or four months' duration.

Case of Laryngeal Tuberculosis.

DR. LONG then showed a patient, thirty-nine years of age, who has had sore throat almost all his life—up to about four years ago. Since then he has been free from it until last summer. Then, his throat being again sore, he consulted a physician, who said the tonsils should be removed. This operation was performed successfully in November, and about three or four weeks after that he commenced being hoarse. His hoarseness has persisted ever since, although fluctuating somewhat. Otherwise, he has enjoyed perfect health. There have been no indications of lung trouble. His father died at thirty-six with some lung trouble. Was sick for three or four months, and patient thought it was pneumonia. Dr. Long had this patient's chest examined by Dr. Cole, who stated that there was nothing found. There has been an ulceration of the mouth, several ulcers of the tongue, and ulcers of the pharynx. These were examined microscopically, and the report of the pathologist was necrosis with cell formation. Bacteriologic examination showed pneumococcus and streptococcus formations. Epithelial cells found. One peculiar thing is that these ulcers in the mouth improve and new ones form. Wassermann test negative. Tuberculin test positive.

On the strength of the positive tuberculin test, the laboratory report, and there being no improvement from treatment, as well as the voice still remaining hoarse, and the recent discovery of two lymphatic nodes, one on each side, the speaker was led to the belief that the condition was one of tuberculosis. The patient does not believe it possible that he has tuberculosis, because otherwise he enjoys such perfect health. Dr. Freer had seen this patient with Dr. Long, and had agreed with him that the ulcers in the mouth were of tuberculous origin.

Case of Double Cerebellar Abscess, With Recovery Following Operation.

Dr. Burton Haseltine said that the patient had presented very interesting clinical points. He was inclined to believe that there has been no report in the literature of a bilateral cerebellar abscess with recovery. This case followed an acute infection of the right middle ear. The boy is about eighteen years old, in good health previous to the time of getting a grippal cold, which was accompanied by considerable purulent rhinitis, rather quickly followed by an acute suppurative inflammation of the right middle ear. This ear complication was untreated. There was spontaneous rupture of the drum, with very free purulent discharge for about three weeks. There was considerable swelling of the external ear, and, as described by the family, this was present in front, upward and back of the auricle, suggesting a mastoid condition. The patient was first seen by a physician some five or six weeks after the beginning of the ear trouble, when he began to have vertigo and difficulty in walking. The physician told Dr. Haseltine that at this time the boy had a tendency to fall. There was some vomiting and the usual symptoms suggestive of cerebellar trouble.

Dr. Haseltine first saw the case on January 26th, at which time the patient was in bed, being unable to walk, and also having the appearance of sepsis, combined with a subnormal temperature of about two degrees. The pupils were widely dilated, equal on both sides. No reaction to light. Moderate amount of optic neuritis—equal on both sides. Mental condition perfectly normal, except that there was some delay. Coordination about the same on both sides. Could not stand without falling, and at that time fell to the right. Had had several attacks of spontaneous vomiting. Nystagmus on looking either to the right or left side—rather marked, but not on looking straight ahead at this time.

A clinical diagnosis was made by Dr. Haseltine of abscess of the right cerebellum, and it was advised that he be brought to Chicago. On his arrival here the boy was very much better. Dr. Grinker was then called in consultation, and he made a very extensive examination. At that time the blood examination showed only nine thousand white count; red cells about normal, with a lymphocytosis both absolute and relative to a mild degree. Temperature came up to normal. For seven days he was kept in the hospital under observation. Tuberculin test negative. Temperature about normal. No particular change in the symptoms. On the seventh day he developed labyrinth symptoms for the first time, with distinct rotatory nystagmus. The right labyrinth did not respond to the caloric test. Hearing apparently normal in the right ear. Normal reaction to caloric test on left side. The mastoid showed absolutely no symptoms except a slight difference in transillumination, the right being a little darker. There was no pain. Middle ear normal in appearance. Drum head had spontaneously ruptured, as stated above, and the discharge had ceased.

When the labyrinth symptoms developed, operation was performed on the mastoid. The dura was exposed and the mastoid cleaned out. The cells were dark, but not broken down. Culture showed the staphylococcus aureus. The labyrinth was exposed, but the speaker did not open the upper nodules. Forty-eight hours after this mastoid operation the temperature was normal, the rotatory nystagmus had diminished, pupil dilatation was decidedly less, and all the symptoms were better. Six or seven days following this the cerebellar symptoms returned, and on the eighth day the speaker opened the cerebellum. This patient had some bilateral symptoms. The right sphenoidal bone was explored and nothing was found. An opening over the right cerebellum released a large abscess. Examination showed a practically pure culture of the yellow staphylococcus.

This operation was followed by immediate improvement, and after seven weeks, with the usual drainage, he was allowed to leave the hospital, although there was still some drainage. Five days after leaving, the temperature suddenly went up to 104° and the symptoms returned. He was taken back to the hospital, the canal dilated, and a probe inserted to the bottom. At the depth of four and one-quarter inches there was some bad looking tissue and a small amount of pus. He then took an X-ray picture with the instrument in the wound, and was surprised to find that the end of the probe was over in the opposite hemisphere. He then had some silver tubes made, and met the problem of draining a left-sided abscess through the opening in the right side of the head. These tubes were cut off as the cavity became smaller. At the last rubber tubes were used for drainage, and then gauze. At this time there was still a canal of one and one-half inches, which was draining with a little gauze strip, but at the present time there was practically no discharge.

(NOTE.—As we go to press the patient is entirely well, the wound has closed, and he is able to go about his usual duties.)

DISCUSSION ON DR. HASELTINE'S CASE.

DR. JULIUS GRINKER said that on the day of his first examination he found the evidences of right-sided cerebellar disease. As there was a history of infection preceding the development of symptoms, earache and purulent rhinitis, with discharge, and some mastoid involvement, combined with a history of subnormal temperature and leucocytosis (twelve thousand), the speaker did not think there was any difficulty in diagnosing the case as cerebellar abscess. Patient was apathetic, slow in speech, thought and locomotion. He had bilateral cerebellar ataxia, more marked on the right side. There was nystagmus and double optic neuritis—not well marked, but sufficiently so to be recognized as such. Instead of the classical slow pulse, there was rather a small and rapid pulse. Temperature had a tendency to subnormal rather than elevation. The diagnosis of cerebellar abscess was made by Dr. Grinker, independently of Dr. Haseltine, who had previously made the same diagnosis. But from the symptoms presented it was questionable whether immediate operation on the cerebellum was justified without previous exploration of the intervening territory. The history of mastoid trouble could not be disregarded. He agreed with Dr. Haseltine that it would be best to explore the mastoid first. The next question was as to the advisability of going into the cerebellum after the mastoid operation. Dr. Halestine mentioned the fact that there were symptoms which did not indicate exactly a unilateral abscess. Those symptoms were: Exaggerated tendon reflexes on the right side, a phenomenon which does not fit in the picture of left sided cerebellar disease. In addition there was speech disturbance, suggestive of a mild type of aphasia. Aphasia, as is well known, is not produced by right sided trouble, the speech centers being localized on the left side. This made the speaker hesitate. He also thought that before going into the cerebellum it would be well to ascertain the absence of a meningitis serosa interna, which occasionally occurs in connection with pachymeningitis following mastoid disease, usually in the vicinity of a pus depot. A lumbar puncture was made, and the boy felt somewhat relieved after the withdrawal of a moderate amount of fluid which was under great pressure but showed negative laboratory findings otherwise.

The patient's symptoms continuing, the speaker advised exploration of the temporosphenoidal lobe adjoining the territory of the right mastoid, and in the absence of a depot of infection to proceed to the cerebellum. What use could it have been to operate on the cerebellum when perhaps a depot in the temporosphenoidal lobe was left to continue the work of infecting the brain? Dr. Haseltine then explored the temporosphenoidal lobe, which was found free from pus. It was then decided to enter the cerebellum at once, which was done, and a large right sided abscess discovered. Dr. Grinker had no idea that there was an abscess in the left cerebellum also until Dr. Haseltine some time later introduced a probe into the abscess cavity as far as it would go, and then had a picture taken. This showed conclusively that the probe had entered the other hemisphere. Dr. Haseltine then continued to drain more extensively until there was no more pus escaping. The result must be considered brilliant.

Dr. Grinker does not recollect having ever seen a cerebellar abscess which was bilateral in distribution—certainly not a bilateral abscess which proceeded to recovery—and he has seen a number of cerebellar abscesses. He thinks the procedures followed in this case were conservative and at the same time radical. He remembered a similar case at the County Hospital, in which the symptoms pointed strongly to abscess in the cerebellum, and he diagnosed it as such and advised operation. As a matter of fact, the operator, after careful search, failed to find the abscess, and postmortem examination revealed the seat of abscess in the frontal lobe. There are real difficulties in the differentiation between cerebellar and frontal lobe disease, which time does not permit me to discuss in detail.

Another interesting feature in Dr. Haseltine's case was the symptom of frontal headache—a symptom pointing to the frontal lobe, but not rarely found in cerebellar disease, abscess, or tumor. The speaker has under observation a case, operated on by Dr. Ochsner a few days ago, in which he diagnosed an acousticus tumor, and in which the headache was never occipital, but almost always frontal in location. The explanation is that the frontopontine cerebellar tract has its origin in the frontal lobe. Oppenheim also speaks of cerebellar abscess causing symptoms referable to the frontal lobe. On the whole the surgical work in this case was cleverly executed by Dr. Haseltine, and neither he nor Dr. Grinker regretted that they had not proceeded faster. The moment the diagnosis was absolutely certain and other depots had been explored, the radical operation was performed. The case is also remarkable from the fact that it is possible to drain a very extensive abscess with but little trauma to surrounding tissue if one uses an unyielding tube of the proper caliber. Of course, much of the cerebellum has been destroyed. As a result there is still ataxia on the left side, but you see how much more extensive the ataxia is on the right side. Had the cerebellum been entered also on the left side, much more cerebellar tissue would have been destroyed. The young man still has a tendency to the drunken gait, and Dr. Grinker is certain that this would have been much worse had there been an additional opening in the other cerebellar hemisphere.

Case of Recovery From Marked Hydrorrhea Nasalis of Hysterical Origin.

Dr. Joseph C. Beck said that the first case was one of a young lady who had been presented to the society a year ago. At that time she had a marked hydrorrhea nasalis, and a diagnosis was made independently by Dr. Grinker and Dr. Beck that it was a hyteric condition. Some of the members considered it a much more serious condition, and not hysteria. Nevertheless, this patient was sent home shortly after she was presented at the meeting, and since that time has completely recovered without any treatment. Previous to that time she had had fifteen operations on the sinuses and throat. All she did after she left Dr. Beck's service was to take a long vacation with some friends, and Dr. Beck promised her that if she got well she could take up nursing. That she has since done at the North Chicago Hospital.

Necrosis of Nose Following Removal of Tear Duct.

The second case he wished to show was much more interesting and important, because it fitted in so well with Dr. Pierce's case. This man had tear duct removed on account of a swelling on the right side of the face, and following that his nose and right side of the face became very much swollen and a necrosis developed on the side of the nose. The diagnosis of lues was made. Wassermann faintly plus. He was treated vigorously with a number of neosalvarsan injections, large doses of iodids and mercury, with absolutely no result. At one time, however, it was thought that the condition might be tuberculous, and he received three treatments of deep X-ray therapy by the Coolidge tube, following which he was given salvarsan intravenously instead of neosalvarsan. The nose cleared up after this, and the speaker thought this proved that salvarsan and not neosalvarsan was the specific in this case. But that was only temporary. Dr. Beck then consulted Dr. Ormsby. Subsequent history showed the man was married and had two healthy children. There was absolutely no history of lues. Dr. Ormsby, after careful consideration, decided that it was a case of chronic septic infection of the nose, and should receive vaccines (which the patient had received without much effect before) and also X-ray treatments. He was not given any more vaccines, but received eight deep X-ray treatments with the Coolidge tube, and the improvement was marvelous. He improved over night, so to speak.

The case was very interesting, in that all that the man complained of at first was a chronic dacryocystitis, for which he had an operation on the tear duct, which was followed by the necrosis. It had every evidence of a specific lesion, but treatment proved the opposite.

Case of Labyrinth Disease—Operation—Recovery.

Case 3.—This patient had measles as a child, and chronic bilateral suppurative otitis media, which was operated on, ten years ago. He was then considered absolutely deaf and was a pupil in Miss MacGowan's school for deafmutes. The speaker had operated him—a bilateral radical mastoid—and had then lost track of him until some weeks ago, when he came back to him with symptoms of severe headache on the right side. A suppuration from the region of the promontory was discovered, and a labyrinth operation performed. In this connection Dr. Beck wishes to state that both ears were negative to all tests as to a functionating labyrinth. He was absolutely deaf. He has a fair speech, characteristic of deafmutes, being a splendid lip reader. In cleaning out of the labyrinth Dr. Beck used one instrument, namely, the bur. He took out the entire labyrinth, saving the facial bony canal, with the happy result that the ear is dry, there is no facial paralysis, and the headaches are entirely subsiding.

Trifacial Neuralgia.

Case 4.—This man was operated by Dr. Ballenger for a radical frontal sinus operation. He has a depression over the frontal sinus, but complains of very marked pain. He now has a trifacial neuralgia, for which condition he has been promised relief by injections of the Gasserian ganglion. There is nothing to be seen except that the pain is intense. The man is frantic over the condition. It is on one side, and not classical of the condition, but Dr. Beck feels that all other things have been done except injection of the nerves, and so probably the treatment spoken of will be the only thing to do. He has subjected three cases to Gasserian ganglion injections, and it is one treatment that certainly offers a splendid opportunity for relief of such severe pain as these cases present. The result of the operation is all that one may expect—absolute freedom from pain. He really did not intend to show this patient as such, because he had not made a close enough study of his condition, having seen him in his clinic that day for the first time, but wished to show him in connection with another case of "looking for an operation patient." There are some people who are running about from clinic to clinic to be operated upon, a sort of mania for it, and the second case he had hoped to show was a woman whose history showed that she had seen about thirty specialists in ear, nose and throat—mostly members of the society—many of whom had operated upon her. She has had a bilateral radical sinus operation, including externally, and both mastoids and tonsils. The additional interesting point is that the patient steals from other patients whenever she is admitted to the hospital.

DISCUSSION ON DR. PIERCE'S CASES.

Dr. J. Holinger wished to say a word about a plastic operation of one wing of the nose in connection with Dr. Pierce's and Dr. Beck's cases. One wing of the nose had been destroyed by necrosis. The tissues of the face are very elastic. To cover the defect he made two slightly divergent incisions from the end of the defect backwards over the cheek, and loosened a large flap between the incisions. He stitched the bleeding base of the flap to the edge of the bony aperture of the nose. That gave sufficient loose skin tissue to cover the whole defect with a loose flap, which was well supplied with blood. There was absolutely no tension on the back of the nose, because the whole tension was right at the edge of the pyriform aperture. The flap fell in its place automatically. The cosmetic result in this case was very good. To improve the looks of the nose hole, he folded the end of the flap inward and stitched it loosely. The flap healed in nicely and smoothly. He thought this might offer a suggestion to both Dr. Pierce and Dr. Beck for a plastic operation. He saw the patient again three years after the operation. The nose looked very nicely.

Dr. Joseph C. Beck saw the case Dr. Pierce presented about three or four days ago, and it looked to him like a sarcomatous condition of the nose. It might be an epithelioma or endothelioma, although these conditions certainly differ, at least microscopically.

In regard to the case in which Dr. Pierce was going to do a plastic, and also his own case, he did not know of anything better than the operation Dr. Pierce suggested doing—to sacrifice the finger. The loose flap would be a poor procedure. One of the necessary things is the preservation of the nasal side of the orbit. Any operation around that region which would loosen up tissues around the orbit would defeat the purpose. At the present time he is building up a nose by making an incision over the rib, severing the rib in two parts, leaving it in place and laying bare the finger over the front part, exposing the periosteum, placing the finger underneath the rib, and putting the whole thing in a plaster cast for immobilization. Ten days later resected the rib, when it remained hanging on the finger. He then treated this as an open wound, allowing granulations to form on the piece of the rib at this point (indicating). Now he expects to replant this finger with the piece of rib through the same scar over the chest wall, allowing it to heal in, thus obtaining a large skin flap. Blair, of Kansas City, has reported a number of these cases in *Surgery, Gynecology and Obstetrics.*

Dr. Pierce, in closing the discussion on his cases, said that he had very little faith in flaps derived from the side of the face bridging over such a large defect as that present in the case he had shown. The stitches pull out and the defect is just about as large after the attempt as before. He thinks the only way to remedy these defects is by means of some plastic operation by means of the finger or rib, as Dr. Beck described.

DISCUSSION ON DR. HASELTINE'S CASE.

Dr. Norval H. Pierce asked Dr. Haseltine whether the labyrinth has been tested out since the operation, especially the static apparatus.

Dr. Alva Sowers, speaking for Dr. Haseltine, who had left the room, said that the labyrinth had been tested with the caloric and rotary tests about three weeks ago, and the static labyrinth was found to be still active.

Another point Dr. Sowers wished to mention was that no anesthetic was used during any of the operations.

Dr. Beck asked if no anesthetic at all was used.

Dr. Sowers replied that he received one-sixth grain of morphin preliminary to the first operation.

Dr. Boot asked if no local anesthetic was used either.

Dr. Sowers replied in the negative.

Dr. Pierce said he might be mistaken, but he thought it was important to know whether the labyrinth responded to the caloric test before the abscess was drained. He had understood Dr. Haseltine to say that the labyrinth was normal both for hearing and the caloric test.

Dr. Sowers replied that the static labyrinth was negative. The acoustic labyrinth was normal. He could hear perfectly, previous to the operation. There seems to have been no change at all in the labyrinth except the rotatory nystagmus.

Dr. Pierce asked how the auditory apparatus was tested.

Dr. Sowers said they used a stethoscope, pinching off first one side and then the other, and whispering through it, so that there was no chance of malingering.

Dr. Grinker said he thought that was a very splendid test, and had never seen it used before.

Dr. Pierce asked if the noise apparatus was used at all.

Dr. Sowers said it was not.

Dr. Pierce said he could hardly think the man could hear so well with such a destruction.

Dr. Boot said he would like to know the origin of this abscess. Such abscesses are usually situated close to the temporal bone. This one was quite a distance from it. Was it by direct extension from the mastoid, or was it a metastatic process?

Dr. Grinker, replying to Dr. Boot's question, thought it was a metastasis—not direct continuity or contiguity—as all the intervening brain territory was found free from disease. We know that an abscess will travel quite a distance from the depot of infection. Cases have been described in which abscess was found on the opposite side from the diseased area, but in the majority of cases we look for the abscess in the contiguous territory, on the same side. The most frequent site of otitic abscesses is the temporosphenoidal lobe; next in frequency the cerebellum, and very rarely the frontal lobe.

DR. BECK asked if Dr. Grinker made a test of pronation and supination, or the diadokokinesis test.

DR. GRINKER said he did, but this was inconclusive for localization.

DISCUSSION ON DR. BECK'S CASES.

DR. JULIUS GRINKER just wanted to say a word or two with regard to the last case shown by Dr. Beck, in which a diagnosis of trifacial neuralgia had been made. This man had been under Dr. Grinker's care, and he had put him down as a psychopath. The patient had been talking constantly about still having trouble in the frontal sinus, although he had been operated by competent men, and all signs of disease were found absent after repeated examinations. Dr. Grinker records him as a psychasthenic, with the habitual or psychic sort of pain. At the time of his examination he failed to find anything like a case of trifacial neuralgia. He fears that the results of injection of the Gasserian ganglion in his case will prove disappointing.

Dr. Grinker said he was the first one in America to attack the Gasserian ganglion by the Härtel method, at the County Hospital, and he is very loath to resort to this method unless all peripheral injections have been unsuccessful, for the reason that there is always the real danger of causing corneal ulceration when the Gasserian ganglion injection is successful.

Dr. Grinker had seen the young lady with hysteric hydrorrhea nasalis when she was presented to the society last year. At that time there were absolutely no characteristics of the type of rhinorrhea one finds in connection with neoplasm of the brain, or with extensive intraventricular conditions. So that by a mere process of exclusion he could make the diagnosis of hysteria. He thought that the remarks made in her presence when she was first presented to the society had done a great deal for the girl—that is, the psychotherapeutic treatment was unconsciously practiced. All the other treatments applied afterwards by Dr. Beck had merely a supporting effect, the principal task having been accomplished when she was presented as a case of hysteria that would surely get well. Time and again the speaker has seen patients who were made worse with each consultation, because of the poison that was instilled into their minds as to the existence of organic disease. When we know that patients have no organic disease, we should tell them so.

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